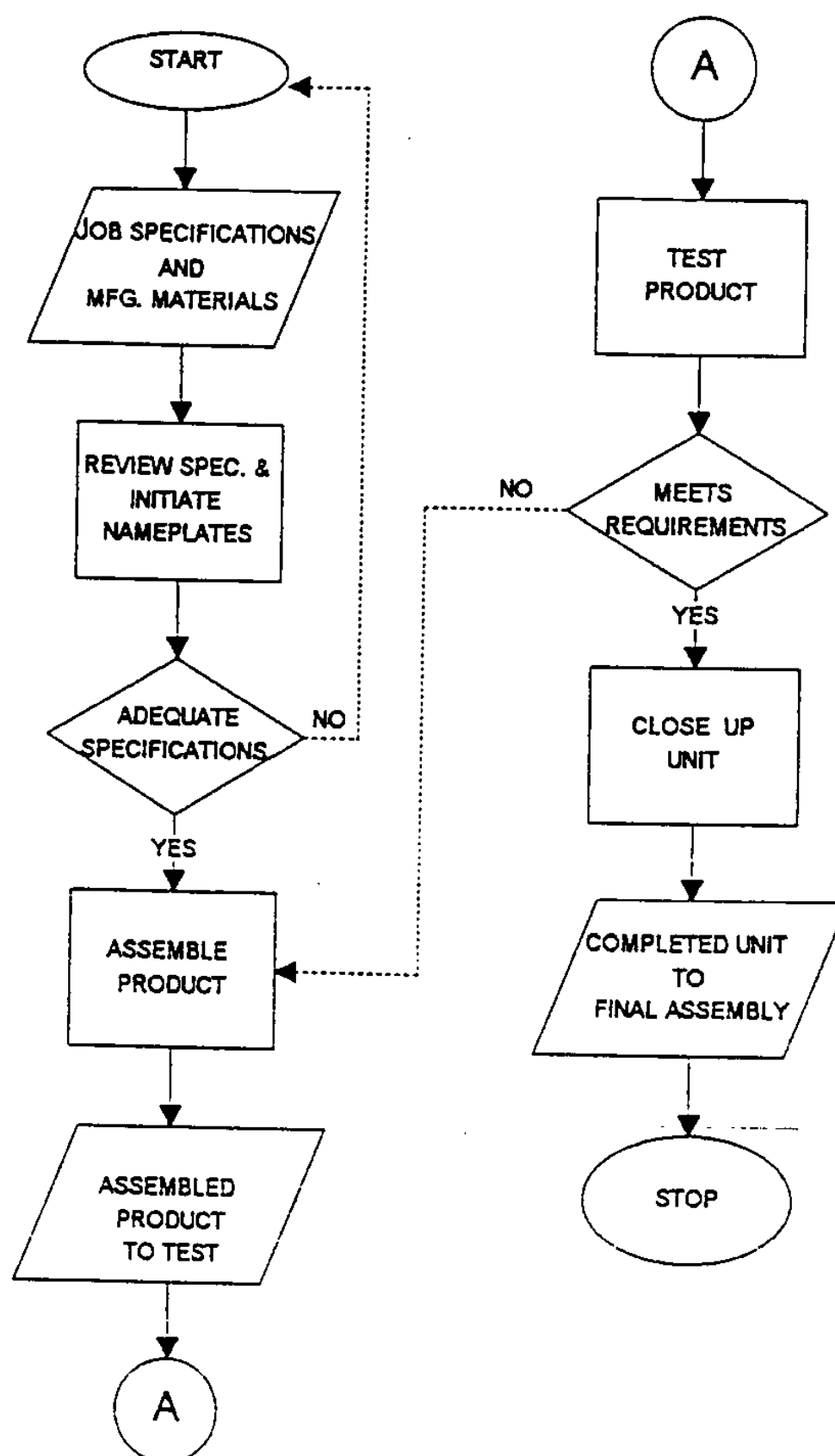


5.3.2 DRAWOUT CIRCUIT BREAKER ASSEMBLY LINE (VAD3)

VAD-3 & VAD-4

• FLOW PROCESS CHART



## WORK INSTRUCTIONS

1. Review factory order specifications (Job Folder) These notes will indicate what is required to assemble the breaker to customer specifications.
2. Review *Engineering Standard Design Index* and initiate processing of nameplates per ES 51156 or ES 52106.

### Work Station-1

#### VAD-3 Frame Riviting

1. Assemble frame componants including spring mtg. brackets and rivit together.
2. Install racking interlock bolt (PN 21401-20562).
3. Install racking stops.
4. Install close position interlock slide and lubricate.
5. Install bottle support rails.

	TOP	BOTTOM
1200A	44068-391-01	44068-392-01
2000A	44068-393-01	44068-394-01
6. Install test position interlock.
7. Install trip arm pivot A and B .
8. Verify pop rivits are installed properly.
9. Tighten all hardware and remove all excessive grease.
10. Complete Assembly Check List, MQP section 6.2, and attach to breaker.

#### VAD-4 Frame Riviting

1. Assemble frame componants and rivit together.
2. Install pole support rails.
3. Complete Assembly Check List, MQP section 6.8 and attach to breaker.

## Work Station- 2

### VAD-3 MECHANISM MOUNTING

1. Install rocker arms and supports.
2. Lubricate all pivot points.
3. Install cross bar assy. and torque to 25 ft/lbs.
  - Solid Bar used on 250 & 750 MVA breakers
  - Hollow Bar used on 500 MVA breakers.
4. Assure paint is acceptable on cross bar .
5. Install MOC, if applicable. (optional)
6. Install washer with thin locking nut.  
Note: Tighten lock nut to allow no side to side movement.
7. Mount mechanism.
8. Install washers and retainer rings (2 ea.) on end of rocker arms.
9. Install cross bar spacers (44068-063-01 and 44068-062-01).  
Note: On 250 & 750 MVA breaker two thin spacers. On 500 MVA one thick and one thin spacer is installed.
10. Apply torque seal to bolts on crossbar.
11. Tighten all hardware, lubricate all pivot points, and remove all excessive grease.
12. Install caution labels.
13. Complete Assembly Check List, MQP section 6.2, and attach to breaker.

---

### **Work Station-3**

#### **VAD-3 Racking, Coils, & Drive Bar Assembly**

1. Install trip & close coils per specifications.
2. Install shutter lift assembly.
3. Install springs and flat washers. Thin washer on large spring (close) and thick washer on small spring (trip).
4. Crimp Lugs on coils.
5. Install drive bar, rollers. Note: Shim drive bar to center line of mechanism drive cam.
6. Install racking arm with shims. Note: Racking gear shimmed to centerline of worm gear with no side to side motion.
7. Lubricate racking assembly.
8. Install racking interlock pin.
9. Install allen head locking screws on ends of racking arm.
10. Tighten hardware and remove all excessive grease.
11. Complete Assembly Check List, MQP section 6.2, and attach to breaker.

#### **VAD-4 Racking, Coils, & Main Link Assembly**

1. Install trip & close coils per specifications.
2. Mount trip link sub assembly.
3. Mount close link sub assembly.
4. Install springs.
5. Install drive bar, rollers and lubricated.
6. Mount racking sub assembly.
8. Install door slide assembly.
9. Mount interlock assembly.
10. Lubricate all pivot points.
11. Complete Assembly Check List, MQP section 6.8, and attach to breaker.

---

## Work Station-4

### VAD-3 Wire Harness Installation

1. Install racking mechanical interlock per specifications.  
Racking link spring - 44068 - 079 - 01  
Close latch spring - 44068 - 080 - 01
2. Secure wire harness with one clamp and nine ties.
3. Install auxiliary contact switch and link per specifications and tighten hardware.
4. Install closing link stop bar on mechanism.
5. Install and wire latch check switch per specification.
6. Install manual charge stop (PN 44068 - 184 - 01).
7. Install manual charging spring installed (PN 44068 - 433 - 01).
8. Mount motor limit switch (PN 9001KA2SERG) adjust and tighten hardware.  
Note: Switch should not extend beyond front edge of breaker.
9. Assure wires on aux switch are still tight after mounting to breaker.
10. Assure wires are clear of closing spring on auxiliary switch.
12. Tighten hardware and remove all excessive grease.
13. Complete Assembly Check List, MQP section 6.2, and attach to breaker.

---

## Work Station-5

### VAD-3 Pole Assembly Mounting

1. Install guide rollers and wheels.
2. Install trip rollers.
3. Install guide pins.
4. Install secondary disconnect subassembly.
5. Install code plate per specifications.
6. Mount ground shoe subassembly.
7. Mount pole subassembly.
8. Install heat sink on 2000 AMP only.
9. Tighten all hardware, lubricate all pivot points, and remove all excessive grease.
10. Complete Assembly Check List, MQP section 6.2, and attach to breaker.

### VAD-4 Pole Assembly Mounting

1. Mount pole assembly.
2. Install guide rail, ground shoe and wheels.
3. Tighten all hardware properly .
4. Lubricate all pivot points.
5. Complete Assembly Check List, MQP section 6.8 and attach to breaker.

Work Station-6

**VAD-3 Shock Assembly & Adjustments**

1. Installed hardware on lower bottle support angle.
2. Mount shock subassembly. Spacing set at 2.97" +/- .030" from top of nut to top of shock. Note: Use fixture # VAD3-029.
3. Verify ground shoe meets specifications Note: Use fixture # VAD3-014.
4. Adjust primary runbacks and torque. Note: Use alignment fixture # VAD3-PRMY.
5. Adjust latch check switch.
6. Install top cover.
7. Verify that Breaker rest squarely on rails.
8. Verify counter functions properly.
9. Verify racking interlock functions properly.
10. Install C.R. plug handle.
11. Adjust trip & close roller. Note use fixture No. VAD3-TRIP.
12. Operated Breaker 75 cycles prior to final verification and Q.A. testing.
13. Verify proper E gap / Bottle gap setting after 75 operations.
14. Verify Final alignment and documented results. Note use Master Gauge No. VAD3-VERF.
15. Contact cage subassemblies installed, hardware tightened, and depth dimension verified. Note use gauge No. VAD3-050.
16. Complete Assembly Check List, MQP section 6.2 and attach to breaker.

#### **VAD-4 Shock Assembly & Adjustments**

1. Installed hardware on lower bottle support angle.
2. Clean all excess grease.
3. Install labels
4. Mount shock subassembly.
5. Adjust latch check switch.
6. Install top cover.
7. Lubricate all applicable parts.
8. Adjust ground shoe.
9. Mount contact sub assemblies.
10. Verify counter operation & racking interlock.
11. Lubricate all pivot points.
12. Complete Assembly Check List, MQP section 6.8 and attach to breaker.

#### **CLOSE UP VAD-3 & VAD-4**

1. Rating nameplate installed.
2. Front cover is assembled and installed.
3. Torque seal applied to primary runbacks after alignment verification.
4. Finger assemblies are lubricated.



δ.2 VAD-3 Circuit Breaker Assembly Check List

Factory Order # \_\_\_\_\_ Qty \_\_\_\_ Of \_\_\_\_ Page 1 of 7

Insp. By

Station #1

- \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_
1.

Paint and plating is acceptable - appearance, color, type of plating, etc. per specifications.
2.

Racking interlock bolt installed (PN 21401-20562)
3.

Stops are in place.
4.

Close position interlock slide is installed and lubricated.
5.

Correct bottle support rails are installed.

TOP

1200A

44068-391-01

BOTTOM

44068-392-01

2000A

44068-393-01

44068-394-01
6.

Test position interlock is installed and moves freely with hardware properly tightened.
7.

Trip arm pivot A and B is installed with hardware properly tightened.
8.

All excessive grease wiped off.
9.

All hardware tight and pop rivets installed correctly.

Station #2

- \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_
1.

Rocker arm and supports are installed and plating is acceptable.
2.

All pivot points are lubricated.
3.

Correct cross bar is installed and torqued to 25 ft/lbs.  
Solid bar used on 250 & 750 MVA, and hollow bar used on 500 MVA.  
Torque equipment used \_\_\_\_\_  
Calibration Date \_\_\_\_\_
4.

Paint is acceptable on cross bar .
5.

MOC is installed and lubricated, as required.
6.

Washer is installed with thin locking nut.  
Note: Tighten lock nut to allow no side to side movement.
7.

Correct mechanism is installed with all hardware tight.
8.

Washers and retainer rings (2 ea.) are installed on end of rocker arms.

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Station # 2 (Cont'd)

Insp. By

- \_\_\_\_\_ 9. Cross bar spacers (44068-063-01 and 44068-062-01) installed.  
On 250 & 750 MVA breaker two thin spacers. On 500 MVA one thick and  
one thin spacer is installed.
- \_\_\_\_\_ 10. Torque seal is applied to bolts on crossbar.
- \_\_\_\_\_ 11. Hardware is tightened and all excessive grease removed.
- \_\_\_\_\_ 12. Caution labels are installed.

Station #3

- \_\_\_\_\_ 1. Trip & close coil installed per specifications with hardware properly  
tightened.
- \_\_\_\_\_ 2. Shutter lift assembly is installed lubricated and turns freely.
- \_\_\_\_\_ 3. Correct springs and flat washers are installed. Thin washer on large  
spring (close) and thick washer on small spring (trip).
- \_\_\_\_\_ 4. Lugs are properly crimped on coils.
- \_\_\_\_\_ 5. Drive bar and rollers are installed, shimmed adequately, lubricated, and E  
clips installed correctly.  
Note: Shim drive bar to center line of mechanism drive cam.
- \_\_\_\_\_ 6. Racking arm is installed with shims added.  
Note: Racking gear shimmed to centerline of worm gear with no side to  
side motion.
- \_\_\_\_\_ 7. Racking assembly is lubricated.
- \_\_\_\_\_ 8. Racking interlock pin is installed and functions properly.
- \_\_\_\_\_ 9. Allen head locking screws are installed on ends of racking arm.  
Note: (2) on gear side and (1) on right side.
- \_\_\_\_\_ 10. Hardware is tightened and all excessive grease removed.

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MANUFACTURING QUALITY PLAN

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Station #4

Ins. By

\_\_\_\_\_

1. Racking mechanical interlock is installed and greased per specifications.  
\_\_\_\_\_ Racking link spring - 44068 - 079 - 01 installed.  
\_\_\_\_\_ Close latch spring - 44068 - 080 - 01 installed.

\_\_\_\_\_

2. Wire harness is secured with one clamp and nine ties.

\_\_\_\_\_

3. Auxiliary contact switch and link installed per specifications and all hardware properly tightened.

\_\_\_\_\_

4. Closing link stop bar on mechanism is installed.

\_\_\_\_\_

5. Latch check switch installed and wired per specification.

\_\_\_\_\_

6. Manual charge stop installed (PN 44068 - 184 - 01).

\_\_\_\_\_

7. Manual charging spring installed (PN 44068 - 433 - 01).

\_\_\_\_\_

8. Motor limit switch installed, adjusted and hardware properly tightened.  
Note: Switch should not extend beyond front edge of breaker.

\_\_\_\_\_

9. Wires on aux switch are still tight after mounting to breaker.

\_\_\_\_\_

10. Wires clear of closing spring on auxiliary switch.

\_\_\_\_\_

11. Hardware is tightened and all excessive grease removed.

Station 5

\_\_\_\_\_

1. Guide rollers and wheels installed lubricated and turn freely.

\_\_\_\_\_

2. Trip rollers installed and lubricated.

\_\_\_\_\_

3. Correct guide pins installed.  
Note: Thick grove for Harting and thin grove for AMP C.R. plug.

\_\_\_\_\_

4. Secondary disconnect subassembly completed, lubricated and wire harness is secured.

\_\_\_\_\_

5. Correct code plate installed per Special Instructions. (Job Folder)

\_\_\_\_\_

6. Ground shoe subassembly completed, greased and installed.

\_\_\_\_\_

7. Pole subassembly installed and preadjusted.

\_\_\_\_\_

8. Heat sink installed on 2000 AMP breaker.

\_\_\_\_\_

9. Hardware is tightened and all excessive grease removed.

Factory Order # \_\_\_\_\_ Qty \_\_\_\_ Of \_\_\_\_ Page 4 of 7

Station #6

Insp. By

- |       |     |   |
|-------|-----|---|
| _____ | 1.  | Hardware installed on lower bottle support angle.   |
| _____ | 2.  | Shock subassembly completed and installed.<br>Note: Shock spacing set at 2.97" +/- .030" from top of nut to top of shock with <u>fixture # VAD3-029</u> .<br>Fixture is an assembly aid only and does not require calibration.                            |
| _____ | 3.  | Verify ground shoe meets specifications <u>Note: Use fixture # VAD3-014</u> .<br>Fixture Calibration Date _____.  |
| _____ | 4.  | Primary runbacks are torqued, adjusted and bottle supports are straight. <u>Note: Use alignment fixture # VAD3-PRMY</u> .<br>Torque equipment used _____.<br>Calibration Date _____.<br>Fixture is an assembly aid only and does not require calibration. |
| _____ | 5.  | Latch check switch is adjusted.   |
| _____ | 6.  | Top cover installed and hardware properly tightened.  |
| _____ | 7.  | Verify Breaker rest squarely on rails.  |
| _____ | 8.  | Verify counter operation.   |
| _____ | 9.  | Verify racking interlock.   |
| _____ | 10. | C.R. Plug handle installed and operates freely without binding.   |
| _____ | 11. | Trip & close roller is adjusted. <u>Note: use fixture No. VAD3-TRIP</u><br>Fixture is an assembly aid only and does not require calibration.  |
| _____ | 12. | Breaker was operated 75 cycles prior to final verification and Q.A. testing.  |
| _____ | 13. | Proper E gap / Bottle gap setting verified after 75 operations.   |
| _____ | 14. | Final alignment verified and documented. <sup>Per MAP 6.12 &amp; 6.13</sup> <u>Note: use Master Gauge No. VAD3-VERF</u> .<br>Gauge calibration date _____.  |
| _____ | 15. | Contact cage subassembly installed, hardware tightened, and depth dimension verified per Gauge NO. VAD3-050.<br>Gauge calibration date _____.   |
| _____ | 16. | Check sheets have been verified.  |

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CLOSE UP

Insp. By

- |       |    |   |
|-------|----|---|
| _____ | 1. | Rating nameplate and serial number nameplate is installed.            |
| _____ | 2. | Front cover is assembled and installed.                               |
| _____ | 3. | Torque seal applied to primary runbacks after alignment verification. |
| _____ | 4. | Finger assemblies are lubricated.                                     |

6.3 VAD-3 & 4 Mechanism Subassembly Check List

Factory Order # \_\_\_\_\_ Qty \_\_\_\_ Of \_\_\_\_ Page 6 of 7

Insp. By.	
_____	1. Manual charge assembly built, greased and has no excessive side to side motion.
_____	2. Charge and discharge indicator installed, greased. Springs installed and operate freely.
_____	3. All hardware tight and wire tie holders are in correct position.
_____	4. Counter installed and operation verified.
_____	5. Charge motor PN _____ installed and is correct voltage per specification. Motor shaft rotates freely.
_____	6. Motor lubricated and tightened.
_____	7. 240v and 48v motors on mechanism are tagged.
_____	8. Lugs on motor are installed correctly and wire wrapped..
_____	9. All cams and drive spring torque arms are in correct operating positions.
_____	10. All charging hold paws are in correct positions.
_____	11. Charged / discharged labels installed properly and flush at bottom of indicator.
_____	12. Open / closed labels installed properly and flush at bottom of indicator.
_____	13. Grease drive spring torque arm retainers.
_____	14. Retaining rings and E clips are installed properly.
_____	15. Guide cam and motor eccentric grove is greased.
_____	16. Final inspection of completed mechanism performed and accepted.

# DRAWOUT CIRCUIT BREAKER ASSEMBLY MANUFACTURING QUALITY PLAN

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### 3.4 VAD-3 & 4 Pole Subassembly Check List

Factory Order # \_\_\_\_\_ Qty \_\_\_\_ Of \_\_\_\_ Page 7 of 7

**Insp. By**

1. Bottle assembly verified to engineering specifications.
2. Record bottle type and serial numbers.  
Type \_\_\_\_\_  
Serial \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. Correct fixed conductor and push pins are installed and 1/2" bolt torqued to 42 ft/lbs.  
Torque equipment used \_\_\_\_\_  
Calibration date \_\_\_\_\_
4. Guide plate is tight on 500MVA Breakers.
5. Bottle support is installed and hardware is tight.
6. Correct flex connector block is used, mounted straight and torqued per specification.  
Torque equipment used \_\_\_\_\_  
Calibration date \_\_\_\_\_
7. Copper foil is installed and torqued per specification.  
Torque equipment used \_\_\_\_\_  
Calibration date \_\_\_\_\_
8. Bottle housing is free of cracks and is clean. Note: Clean with window cleaner.
9. Correct bottles installed in housing with labels legible.
10. Install movable conductors, connect flex connectors and torque per specifications.  
Torque equipment used \_\_\_\_\_  
Calibration date \_\_\_\_\_
1. Pushrod is installed per specification and locktite applied to inside hole of bottle.  
Note: Locktite must cure 24 hours prior to final installation on breaker.  
Date of subassembly \_\_\_\_\_
2. After correct assembly of push rod , verify that bias spring sleeve can be turned by hand for adjustment.
3. Heat sinks are installed on 2000A movable conductor.
4. All torque connections are marked.

6.13 VAD3 Final Alignment Verification Log

Factory Order # \_\_\_\_\_ Qty \_\_\_\_ Of \_\_\_\_

1. \_\_\_\_\_ Verification fixture # VAD3-VERF has been zeroed to master gauge # VAD3-MSTR per MQP Special Instructions Page 38.

Fixture Zeroing Interval:

- Beginning of shift (Date \_\_\_\_\_ Time \_\_\_\_\_).
- Setup change 1200A or 2000A (Date \_\_\_\_\_ Time \_\_\_\_\_).

2. \_\_\_\_\_ Breaker passed all test per MQP Special Instructions Page 39.

- Breaker operated at minimum close.
- Breaker passed maximum close test.
- Breaker operated at minimum trip.
- Breaker passed maximum trip test.
- Breaker passed maximum ground shoe test.
- Breaker passed minimum ground shoe test.
- Test pass light was illuminated.
- Probe nominal light was illuminated.

Note: If these lights are not illuminated, breaker must be taken back to the previous work station for rework.

3. \_\_\_\_\_ Probe indicator readings were:

VAD3-VERF

	Brkr. Tolerance	C Phase		B Phase		A Phase	
		Nominal	Actual	Nominal	Actual	Nominal	Actual
Upper	+/- .100	1-1	23.59	1-2	13.59	1-3	3.59
	+/- .100	2-1	23.5	2-2	23.5	2-3	23.5
	+/- .150	3-1	21.76	3-2	21.76	3-3	21.76
Lower	+/- .100	1-4	23.59	1-5	13.59	1-6	3.59
	+/- .100	2-4	11	2-5	11	2-6	11
	+/- .150	3-4	21.76	3-5	21.76	3-6	21.76