

Instructions For SF₆ Refill Kit

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Introduction

Qualified Persons

WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended ONLY for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating your Vista Underground Distribution Switchgear. Familiarize yourself with the Safety Information and Safety Precautions on pages 3 and 4. The latest version of this publication is available online in PDF format at sandc.com/en/support/product-literature/.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your SF₆ refill kit for use with Vista Underground Distribution Switchgear. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

WARNING

The equipment in this publication is only intended for a specific applications. The applications must be within the ratings furnished for the equipment. Ratings for the Vista Underground Distribution Switchgear are listed in Table 1 in Specification Bulletin 681-31. The ratings are also on the nameplate affixed to the product.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150, "Standard Conditions of Sale—Immediate Purchasers in the United States," (or Price Sheet 153, "Standard Conditions of Sale—Immediate Purchasers Outside the United States,") plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153).

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to your Vista Underground Distribution Switchgear. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER
“DANGER” identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.


⚠ WARNING
“WARNING” identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION
“CAUTION” identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE
“NOTICE” identifies important procedures or requirements that can result in product or property damage if instructions are not followed.

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C’s website sandc.com, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE	
Read this instruction sheet thoroughly and carefully before refilling your Vista Underground Distribution Switchgear.	

Replacement Instructions and Labels

If additional copies of this instruction sheet are needed, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER



Vista Underground Distribution Switchgear operate at high voltage. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to switchgear must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
5. **CLOSING AND LOCKING ENCLOSURES.** The pad-mounted enclosure (if furnished) must be securely closed with padlocks in place at all times unless work is being performed inside the enclosure.
6. **ENERGIZED BUSHINGS.** Always assume the bushings are energized unless proved otherwise by test, by visual evidence of an open-circuit condition at the load-interrupter switch or fault interrupter, or by observing the load-interrupter switch or fault interrupter is grounded.
7. **BACKFEED.** Load-interrupter switches and fault interrupters may be energized by backfeed.
8. **DE-ENERGIZING, TESTING, AND GROUNDING.** Before touching any bushings or components inside the switchgear tank that are to be inspected, replaced, serviced, or repaired, always disconnect load-interrupter switches and fault interrupters from all power sources (including backfeed), test for voltage, and properly ground.
9. **TESTING.** Test the bushings for voltage using the **Voltage Indication** feature (if furnished) or other proper high-voltage test equipment before touching any bushings or components inside the switchgear tank that are to be inspected, replaced, serviced, or repaired.
10. **GROUNDING.** Make sure the switchgear tank and pad-mounted enclosure (if furnished) are properly grounded to the station or facility ground. After the switchgear has been completely disconnected from all sources of power and tested for voltage, properly ground the load-interrupter switches and fault interrupters before touching any bushings or components inside the switchgear tank that are to be inspected, replaced, serviced, or repaired.
11. **LOAD-INTERRUPTER SWITCH AND FAULT INTERRUPTER POSITION.** Always confirm the **Open/Close/Grounded** position of load-interrupter switches and fault interrupters by visually observing the position of the blades. Load-interrupter switches and fault interrupters may be energized by backfeed. Load-interrupter switches and fault interrupters may be energized in any position.
12. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized bushings.

General

Vista Underground Distribution Switchgear has been carefully designed to provide extremely reliable gas seals. S&C expects gas leaks to be extremely rare. Gas pressure is indicated by the internal pressure gauge. The unit can be operated when the gauge is in the Green or Green/Yellow zone but it must be refilled if the needle is in the Red zone. In the unlikely event a gas leak develops, the Vista switchgear tank can be refilled in the field if the pressure gauge is in the Green/Yellow zone. If the gauge indicates pressure has dropped to the Red zone, the tank may have absorbed

moisture and must be evacuated prior to refilling. If this is necessary, the unit should be returned to S&C for repair and rework. Even if the gauge is not yet in the Red zone, any loss of gas should be investigated thoroughly so the leak can be repaired before refilling.

Before proceeding to the job site, be sure to have an adequate supply of dry SF₆ gas for the unit. The Vista switchgear tank contains the following amount of SF₆ gas:

Table 1. Available SF₆ Gas

Max, kV	Pounds of SF ₆ gas		
	3-Way Models	4-Way Models	6-Way Models
17	13	17	25
29	13	17	25
38	15	19	29

S&C recommends 20% more gas than indicated above be available.

Operation

Refill Procedure

Follow these steps to refill the Vista switchgear tank:

- STEP 1.** Locate the fill port cover in the top front corner of the operation compartment. Clean off all debris and dirt in the general area before removing the plug. Remove the plug using a screwdriver or S&C fill port tool number CU-5987, turning counterclockwise. See Figures 1 and 2.

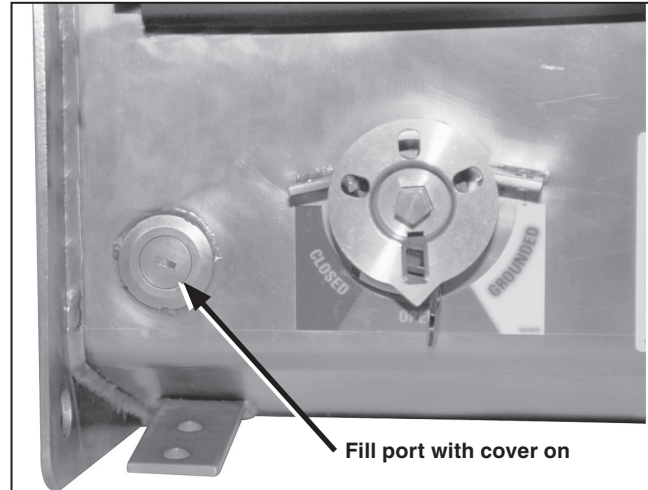


Figure 1. Location of fill port.

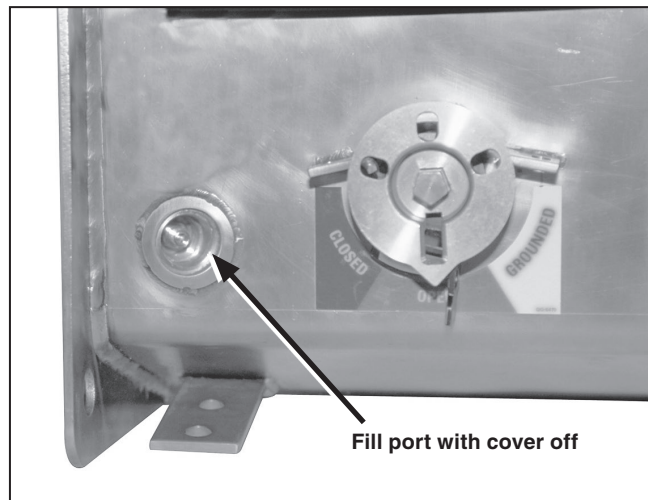


Figure 2. Remove the fill port cover.

STEP 2. The Schrader fill valve is located under the fill port cover. Install the valve extension onto the Schrader valve. Tighten hand tight. Do not over tighten. See Figure 3.

STEP 3. Bleed the fill hose on the refill tank by cracking open the cylinder valve slightly for several seconds to allow the SF₆ gas to fill the hose before connecting to the Schrader valve and extension. See Figures 4 and 5.

Note: Step 4 on page 8 includes further operating instructions for the cylinder and regulator. Close the valve and connect the chuck of the hose to the end of the valve extension. See Figures 4 and 5.

Note: When using the DILO regulator valve, make sure the orange end is fully screwed into place.

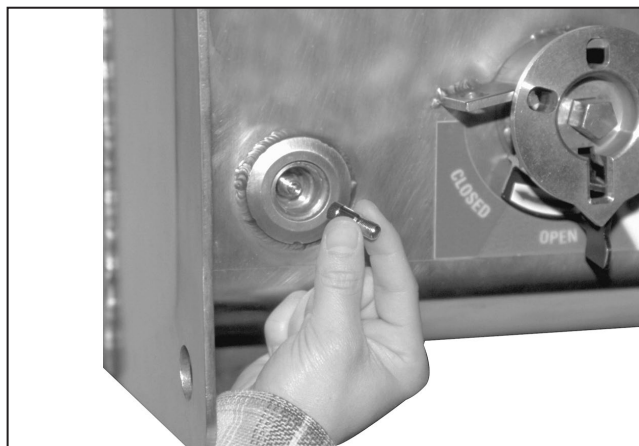


Figure 3. Install the valve extension onto the Schrader valve.

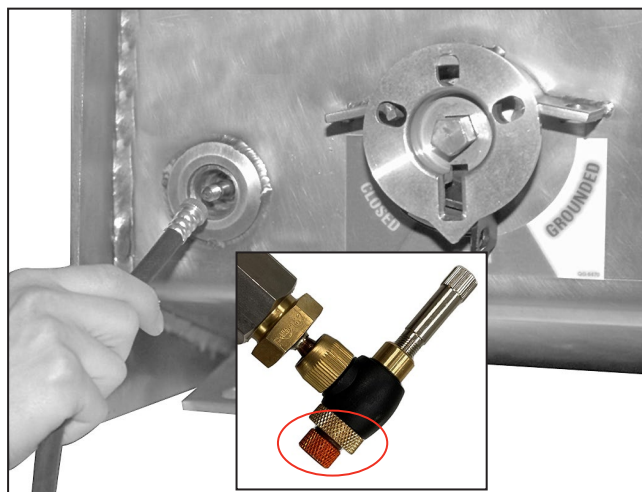


Figure 4. Bleed the fill hose for several seconds to fill the hose before connecting to the Schrader valve extension.

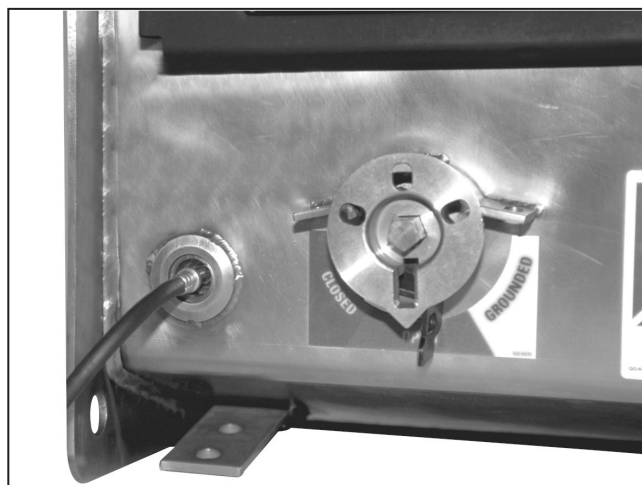


Figure 5. Connect the fill hose to the Schrader valve extension.

Operation

STEP 4. The regulator valve adjusts the maximum fill pressure. When using it:

- (a) Turn clockwise until the nut stops further movement to fully open the regulator valve.
- (b) Back off one full turn (counterclockwise).
- (c) Open the cylinder valve. Turn the regulator valve clockwise until the fill gauge reads approximately 5 to 7 psi. See Figures 6 and 7.

STEP 5. Observe the pressure gauge on the Vista switchgear unit. When in the fully **Open** position, the regulator valve is calibrated to not allow fill pressure to exceed 10 psi. Continue to fill the tank with gas until the needle is at its fill point, in between the tick marks in the Green zone (or for R1 Vista switchgear models rated 15 kV, 12.5 kA sym., at the fill indicator) and then close the cylinder valve. **DO NOT OVERFILL.** See Figures 8 and 9.

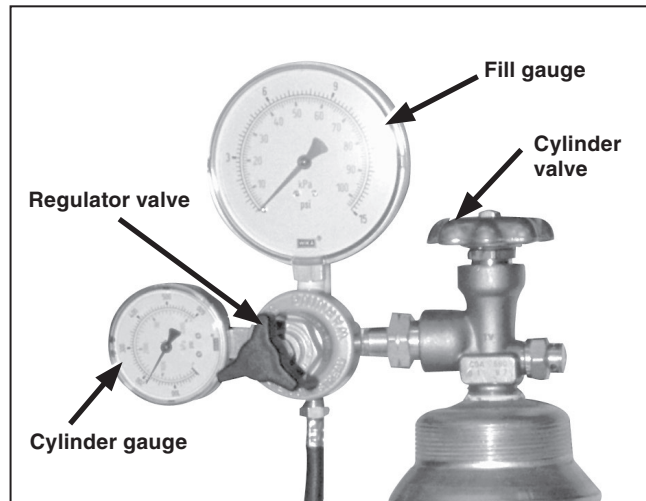


Figure 6. The regulator valve assembly.

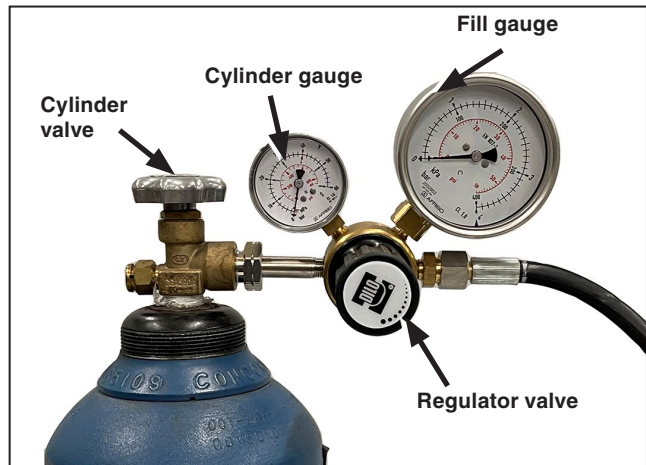


Figure 7. The DILO regulator valve assembly.

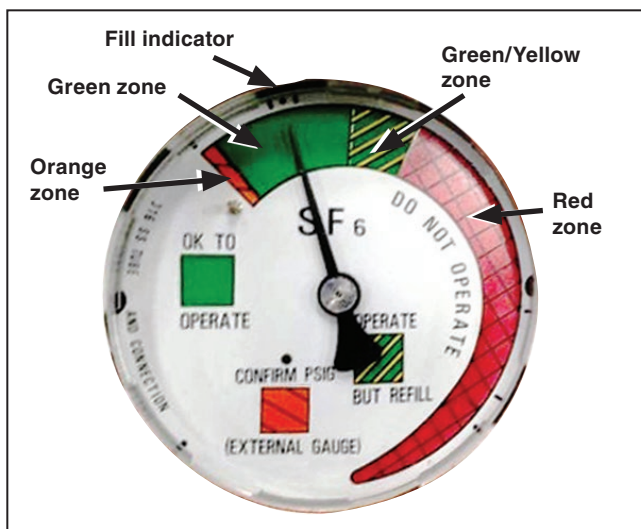


Figure 8. Internal gas-pressure gauge for most Vista switchgear models.

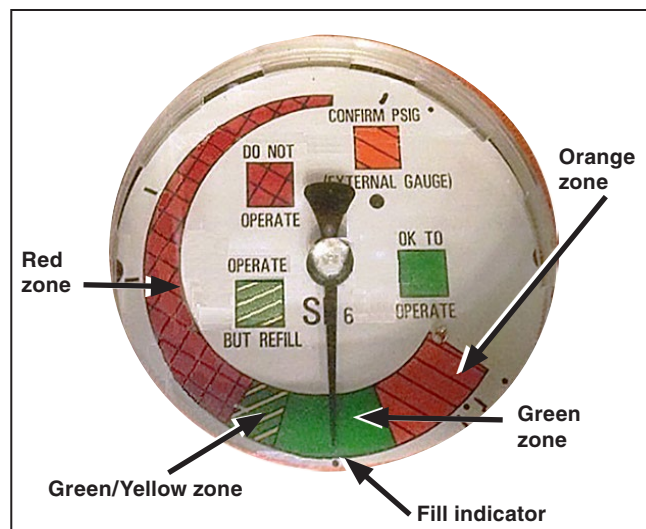


Figure 9. Internal gas-pressure gauge for most Vista switchgear models rated 15 kV, 12.5 kA sym. short circuit that have catalog numbers ending in R1.

STEP 6. With the cylinder valve closed and the regulator valve open, observe the fill pressure reading on the fill gauge. When the needle on the gauge in the tank is in the middle of the Green band (indicated by the tick marks), the pressure should be approximately 7 psi (or 10 psi for R1 Vista switchgear models rated 15 kV, 12.5 kA sym.) Use the gauge on the refill kit to verify this. If the gauge does not indicate 7 psi \pm 0.5 psi at 72°F (22°C), the gauge in the tank is faulty and the unit should be taken out of service for repair.

Note: If the temperature is not 72°F (22°C), consult the temperature/pressure conversion charts (See Tables 2 and 3 on page 10) to identify the correct pressure for the ambient temperature. See Figures 10 and 11.

STEP 7. Remove the fill hose chuck from the valve extension.

STEP 8. Unscrew the valve extension from the Schrader valve.

STEP 9. Remove any dirt or debris in the fill port area. Inspect the fill port cover and O-rings to be sure they are clean and the O-ring is not damaged. If the O-ring is damaged, replace it before re-installing the cover. Re-install the fill port cover over the Schrader valve.

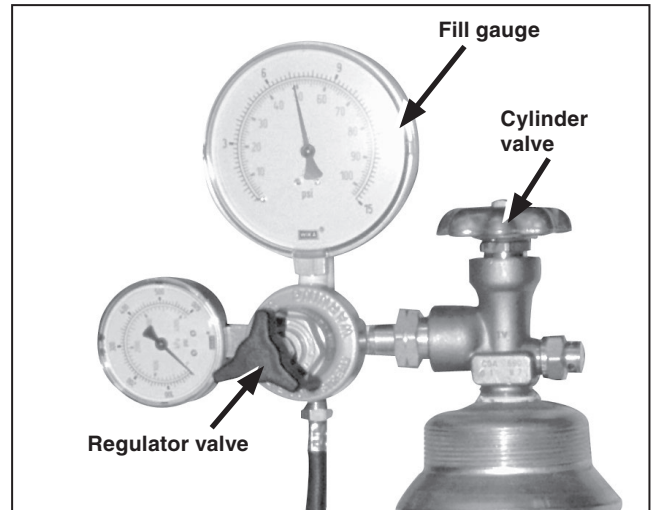


Figure 10. Regulator valve assembly.

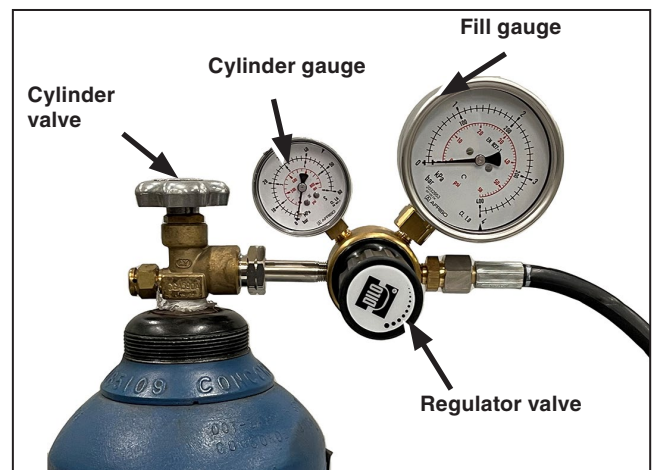


Figure 11. The DILO regulator valve assembly.

Operation

Note: Tables 2 and 3 are to be used when reading the external pressure gauge on the refill kit as noted in Step 6 of the refill instructions. Nominal readings are 7 ± 0.5 psi at 72°F (22°C) when the needle on the internal gauge is in between the tick marks in the Green zone. For other temperatures, these tables can be used to convert the reading. For example, for a unit of non-R1 switchgear (Table 2) at 52°F (11°C), the external gauge should read between 6.2 and 6.9 psi to indicate the internal gauge is functioning properly.

Table 2. Temperature/Pressure Conversion Chart for Most Vista Switchgear Models

Temperature	Nominal Pressure (psig)	
Degrees, F (C)	Sea Level	3300 ft. (1006 m)
131° (55°)	9.5	11.2
122° (50°)	9.1	10.8
104° (40°)	8.4	10.0
86° (30°)	7.6	9.3
68° (20°)	6.9	8.6
50° (10°)	6.2	7.8
32° (0°)	5.4	7.1
14° (-10°)	4.7	6.4
-4° (-20°)	4.0	5.6
-22° (-30°)	3.2	4.9
-40° (-40°)	2.5	4.2

Table 3. Temperature/Pressure Conversion Chart for Vista Switchgear Models Rated 15 kV, 12.5 kA Sym. Short Circuit with Catalog Numbers Ending in R1

Temperature	Nominal Pressure (psig)	
Degrees, F (C)	Sea Level	3300 ft. (1006 m)
131° (55°)	13.0	14.6
122° (50°)	12.5	14.2
104° (40°)	11.7	13.4
86° (30°)	10.8	12.5
68° (20°)	10.0	11.7
50° (10°)	9.2	10.8
32° (0°)	8.3	10.0
14° (-10°)	7.5	9.1
-4° (-20°)	6.6	8.3
-22° (-30°)	5.8	7.5
-40° (-40°)	4.9	6.6