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LARGE DRY CHEMICAL, TWIN-AGENT, AFFF, HALON 1211, AND AQUASONIC (NITROGEN-OPERATED SYSTEMS)

Pressure Regulator Test Manual



A Tyco International Company

FOREWORD

This manual is intended for use with ANSUL Large Dry Chemical, Twin-Agent, AFFF, Halon 1211, AQUASONIC and other systems which require regulated nitrogen cylinders for operating pressure. For systems not covered in this manual, please contact Tyco Fire Protection Products, Technical Services, Marinette, WI 54143-2542.

The procedures contained within this manual should be performed at least annually to ensure the regulators will operate as intended.

If these procedures are being performed during a semi-annual maintenance examination; first, complete the regulator test to make certain regulators are operating properly. Then, perform maintenance examination.

TEST KIT



CAUTION

High pressure nitrogen could cause personal injury or equipment damage if proper test kit is not used. Use only ANSUL regulator test kit (Part No. 78689) which includes a safety relief valve.

The ANSUL Regulator Test Kit (Part No. 78689) includes the following components (see Figure 1):

- Test Kit Assembly (Includes Pressure Relief Valve, Low Pressure Gauge, 3/8 in. Male Quick-Connect Plug, 3/8 in. Ball Valve, Flow Restrictor, Exhaust Muffler, and Required Assembly Fittings)
- Test Hose Assembly (Includes Low Pressure Hose with Two 3/8 in. Female Quick-Connect Couplers)
- 1/4 in. and 3/8 in. Male Quick-Connect Plugs (1 each) – Not Shown
- 1/4 in. and 3/8 in. Female Quick-Connect Plugs (1 each) – Not Shown
- 1/4 in. and 3/8 in. Pipe Plugs (1 each) – Not Shown
- 1/4 in. and 3/8 in. Pipe Caps (1 each) – Not Shown
- Tool Box – Not Shown

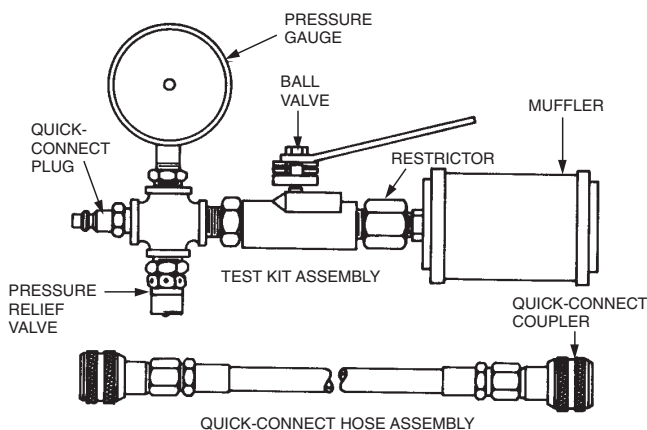


FIGURE 1
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PRESSURE REGULATORS

As shown in Figure 2, two brands of regulators are used with ANSUL nitrogen cylinders.

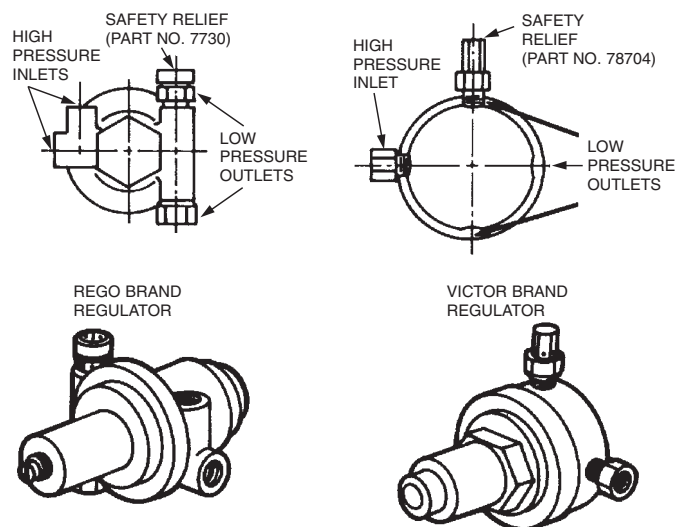


FIGURE 2
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TEST SET-UP

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AGENT TANK ISOLATION

Before the regulator is tested, the agent storage tank should be isolated from the nitrogen supply. This procedure will vary depending on the type of system being tested.

If the tank is not isolated, the tank will be pressurized and the system must be recharged in accordance with the Operation and Maintenance Manual provided with the system.

Dry Chemical Tank (Models S-500 and Larger)

1. Pull ring pin and close Red Tank Valve at tank inlet.
2. Pull ring pin and close Black Dry Chemical Valve at tank outlet.
3. Make certain Blue Hose Clean-Out Valve is closed. (Fixed pipe systems do not contain Blue Hose Clean-Out Valves.)
4. Loosen fill cap from dry chemical tank collar.

AFFF Tank with Red Tank Valve (Nitrogen Shut Off)

1. Pull ring pin and close Red Tank Valve at tank inlet.
2. Pull ring pin and close Black AFFF Valve at tank outlet.
3. Make certain Blue Hose Clean-Out Valve is closed.
4. Loosen fill cap from AFFF tank collar.

AFFF Tank without Red Tank Valve (No Nitrogen Shut Off)

1. Disassemble a union between AFFF tank nitrogen inlet and pressure regulator being tested.
2. Install pipe plug or cap onto union to prevent escape of nitrogen.

Halon 1211 Tanks

1. Pull ring pin and close Red Tank Valve at tank inlet.
2. Make certain Blue Hose Clean-Out Valve is closed.

AQUASONIC System

1. Pull ring pin and close Red Nitrogen Shut-off Valve at tank inlet.
2. Pull ring pin and close Black Water Line Shut-off Valve at tank outlet.

TEST KIT INSTALLATION

On systems with multiple nitrogen cylinders, all regulator outlets are connected to a common manifold. Therefore, a test kit connected to the outlet of one regulator will serve as a test point for all regulators.

To install the test kit, refer to Figure 3 and complete the following steps:



CAUTION

When removing safety relief valves from Victor regulators, turn only inside hex (nearest regulator body). Do not turn outside hex as pressure relief setting could change.

1. Remove pressure relief valve from regulator outlet.
2. Install appropriate quick-connect plug in regulator outlet.
3. Connect test assembly to quick-connect plug using quick-connect test hose provided with kit.

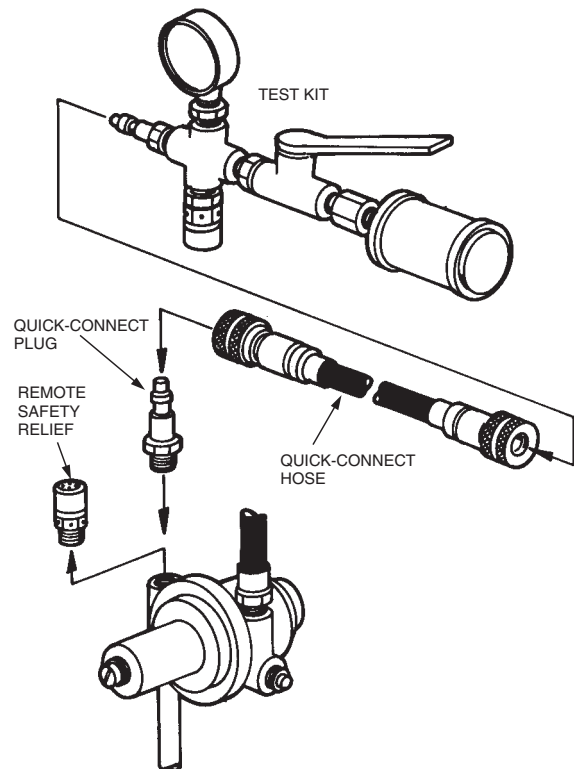


FIGURE 3

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NITROGEN CYLINDER PRESSURE CHECK

In order to perform an accurate regulator test, the nitrogen cylinder must be fully charged.

Check that nitrogen cylinder gauge reads 1800 psi (124 bar) minimum pressure. If cylinder pressure is below 1800 psi (124 bar), install a fully charged nitrogen cylinder by referring to Operation and Maintenance Manual provided with system.

REGULATOR TEST

With the agent storage tank properly isolated, proper test kit connected, and fully-charged nitrogen cylinders installed, test the pressure regulators by completing the following steps:

NOTICE

If test gauge reading exceeds maximum regulator pressure (Table 1) when nitrogen cylinder valve is opened, **immediately** open test kit control valve and close nitrogen cylinder valve. Gauge readings in excess of maximum regulator pressure indicate a malfunctioning regulator.

1. Make certain test kit valve is closed.
2. Using handwheel, slowly open nitrogen cylinder valve while observing test gauge.

NOTICE

For systems equipped with dual regulators, each nitrogen cylinder is supplying pressure to two regulators. Therefore, both regulators are being tested simultaneously.

3. With nitrogen cylinder valve fully open for one minute, observe test gauge pressure. The test kit gauge must read as follows:

Regulator Model	Part No.	Acceptable Pressure Range			
		Minimum		Maximum	
		psi	(bar)	psi	(bar)
Rego	14796/14797	210	(14.5)	230	(15.9)
Rego	14798	210	(14.5)	230	(15.9)
Rego	19821 or	65	(4.5)	85	(5.9)
(Subsurface)	16123/16124				
Victor	24232	195	(13.5)	215	(14.8)
Victor	472014	120	(8.3)	130	(9.0)

TABLE 1

4. Observe test kit gauge while opening test kit valve for 2 – 3 seconds. (In order to conserve nitrogen, this test should not exceed 3 seconds.) The test kit gauge must read as follows:

Regulator Model	Part No.	Minimum Required Flow Pressure	
		psi	(bar)
Rego	14796/14797	140	(9.7)
Rego	14798	140	(9.7)
Rego	19821 or	45	(3.1)
(Subsurface)	16123/16124		
Victor	24232	140	(9.7)
Victor	472014	90	(6.2)

TABLE 2

5. Close nitrogen cylinder valve and open test kit valve to relieve remaining pressure.
6. Repeat Steps 1 through 5 for each nitrogen cylinder and corresponding regulator(s).

7. Disconnect test kit and quick-connect hose from quick-connect plug. Remove quick-connect plug from regulator outlet.

**CAUTION**

When reinstalling safety relief valves into Victor regulators, turn only inside hex (nearest regulator body). Do not turn outside hex as pressure relief setting could change.

8. Reinstall pressure relief valve into regulator outlet. Wrench tighten snugly; do not overtighten. (With Rego regulators, make certain relief valve gasket is in place.)
9. **Systems with One Regulator per Nitrogen Cylinder:** Replace any regulators that are malfunctioning.
Systems with Two Regulators per Nitrogen Cylinder: If initial test indicates that one or both regulators in a pair may be malfunctioning, each regulator in that pair must be tested individually. Complete test on Page 4 for individual testing of dual regulators.
10. Return system to normal operating condition by performing Post-Test Procedures on Page 5.

INDIVIDUAL TESTING OF DUAL REGULATORS

If regulator test indicates that one or both regulators in a pair may be malfunctioning, each regulator in that pair must be tested individually as follows:

- 1. Check pressure of each nitrogen cylinder as detailed on Page 2.
- 2. Disconnect low pressure hoses from both regulators being tested. See Figure 4.
- 3. Install appropriate quick-connect plug in outlet of Regulator No. 1.
- 4. Connect test assembly to quick-connect plug using quick-connect test hose provided with kit.
- 5. Install pipe plug in outlet of Regulator No. 2.

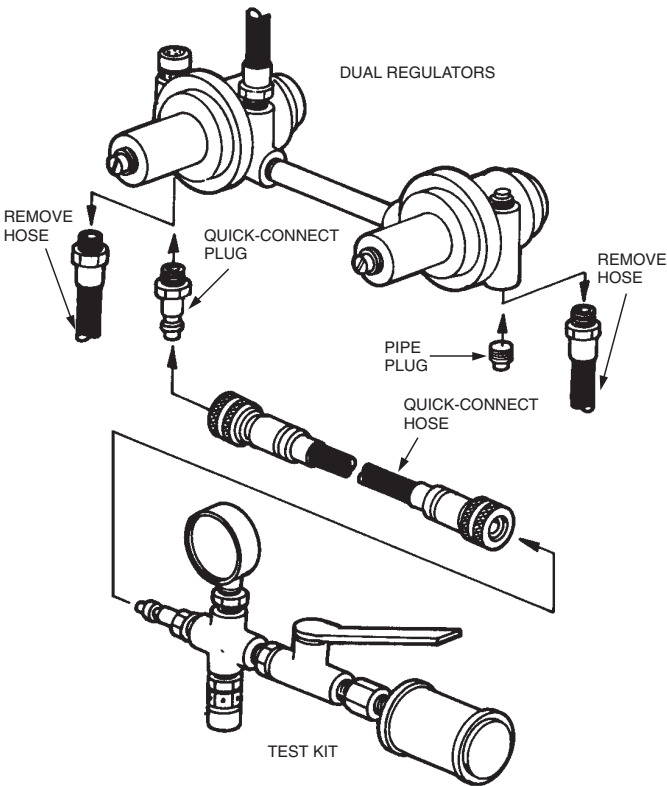


FIGURE 4
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NOTICE

If test gauge reading exceeds maximum regulator pressure (Table 3) when nitrogen cylinder valve is opened, **immediately** open test kit control valve and close nitrogen cylinder valve. Gauge readings in excess of maximum regulator pressure indicate a malfunctioning regulator.

- 7. Using handwheel, slowly open nitrogen cylinder valve while observing test gauge.
- 8. With nitrogen cylinder valve fully open for one minute, observe test gauge pressure. The test kit gauge must read as follows:

Regulator Model	Part No.	Acceptable Pressure Range	
		Minimum psi (bar)	Maximum psi (bar)
Rego	14796/14797	210 (14.5)	230 (15.9)
Rego (Subsurface)	19821 or 16123/16124	65 (4.5)	85 (5.9)

TABLE 3

- 9. Observe test kit gauge while opening test kit valve for 2 – 3 seconds. (In order to conserve nitrogen, this test should not exceed 3 seconds.) The test kit gauge must read as follows:

Regulator Model	Part No.	Minimum Required Flow Pressure	
		psi (bar)	psi (bar)
Rego	14796/14797	140 (9.7)	
Rego (Subsurface)	19821 or 16123/16124	45 (3.1)	

TABLE 4

- 10. Close nitrogen cylinder valve and open test kit valve to relieve remaining pressure.
- 11. Remove pipe plug from outlet of Regulator No. 2.
- 12. Remove test kit, quick-connect hose, and quick-connect plug from Regulator No.1 and install in outlet of Regulator No. 2.
- 13. Install pipe plug in outlet of Regulator No. 1.
- 14. Repeat Steps 6 through 10 to test Regulator No. 2.
- 15. Remove test kit, quick-connect hose, and quick-connect plug from outlet of Regulator No. 2.
- 16. Remove pipe plug from outlet of Regulator No. 1.
- 17. Replace regulator that is malfunctioning.
- 18. Reconnect low pressure nitrogen hoses to regulator outlets. Wrench tighten snugly; do not overtighten.
- 19. Return system to normal operating condition by performing Post-Test Procedures on Page 5.

- 6. Make certain test kit valve is closed.

STORAGE TANK VALVE AND PIPING RESET

Dry Chemical Tank

1. Open Red Tank Valve at dry chemical tank inlet. Insert ring pin through valve handle into bracket and install visual inspection seal.
2. Open Black Dry Chemical Valve. Insert ring pin through valve handle into bracket and install visual inspection seal.
3. Hand tighten fill cap onto dry chemical tank collar.

AFFF Tank with Red Tank Valve (Nitrogen Shut Off)

1. Open Red Tank Valve at AFFF tank inlet. Insert ring pin through valve handle into bracket and install visual inspection seal.
2. Open Black AFFF Valve. Insert ring pin through valve handle into bracket and install visual inspection seal.
3. Hand tighten fill cap onto AFFF tank collar.

AFFF Tank without Red Tank Valve (No Nitrogen Shut Off)

1. Remove pipe plug or cap from union that was disassembled before test.
2. Reassemble union and wrench tighten.

AQUASONIC System

1. Open Red Nitrogen Line Shut-off Valve at low-pressure nitrogen manifold. Insert ring pin through valve handle into bracket and install visual inspection seal.
2. Open Black Water Line Shut-off Valve. Insert ring pin through valve handle into bracket and install visual inspection seal.

Halon 1211 Tanks

Open Red Tank Valve at tank inlet. Insert ring pin through valve handle into bracket and install visual inspection seal.

NITROGEN CYLINDER PRESSURE CHECK

Check that each nitrogen cylinder is fully-charged as follows:

1. Check nitrogen cylinder pressure gauge and note pressure.
2. Check ambient temperature at cylinder location.
3. Refer to appropriate Temperature Correction Chart on pages 6 – 8.
4. If Temperature Correction Chart indicates that nitrogen cylinder is below minimum pressure, install a fully charged nitrogen cylinder by referring to Operation and Maintenance Manual provided with system.

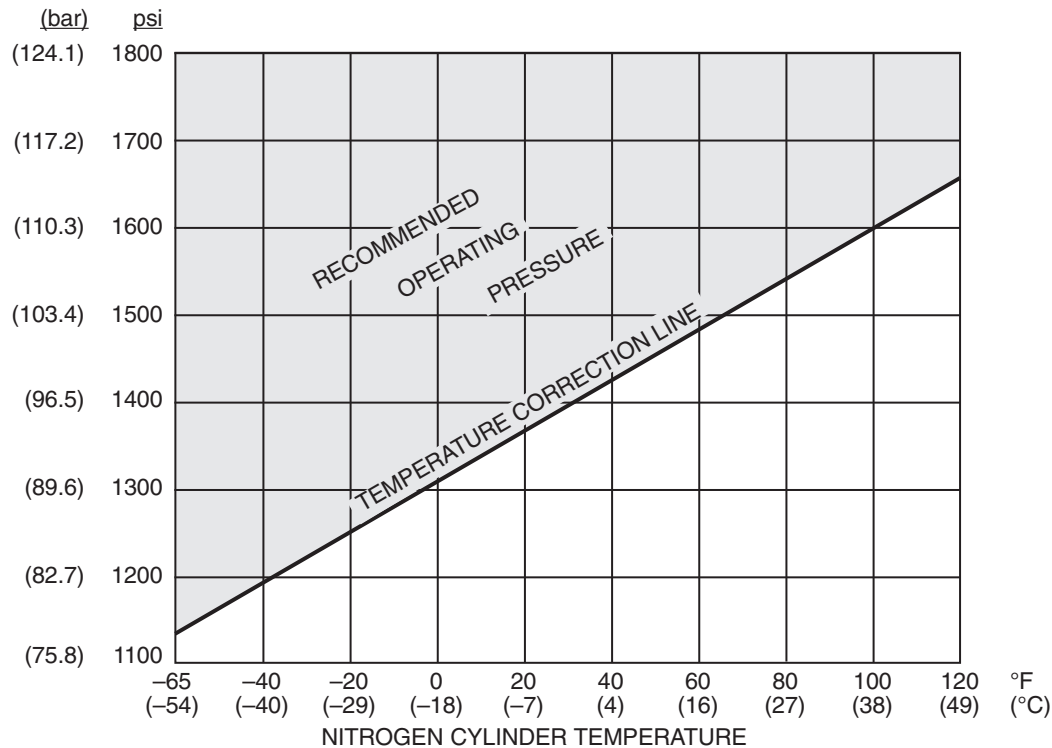
TEMPERATURE CORRECTION CHARTS

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TEMPERATURE CORRECTION CHARTS

100/220 ft³ (3.11/6.23 m³) Cylinders

CYLINDER PRESSURE



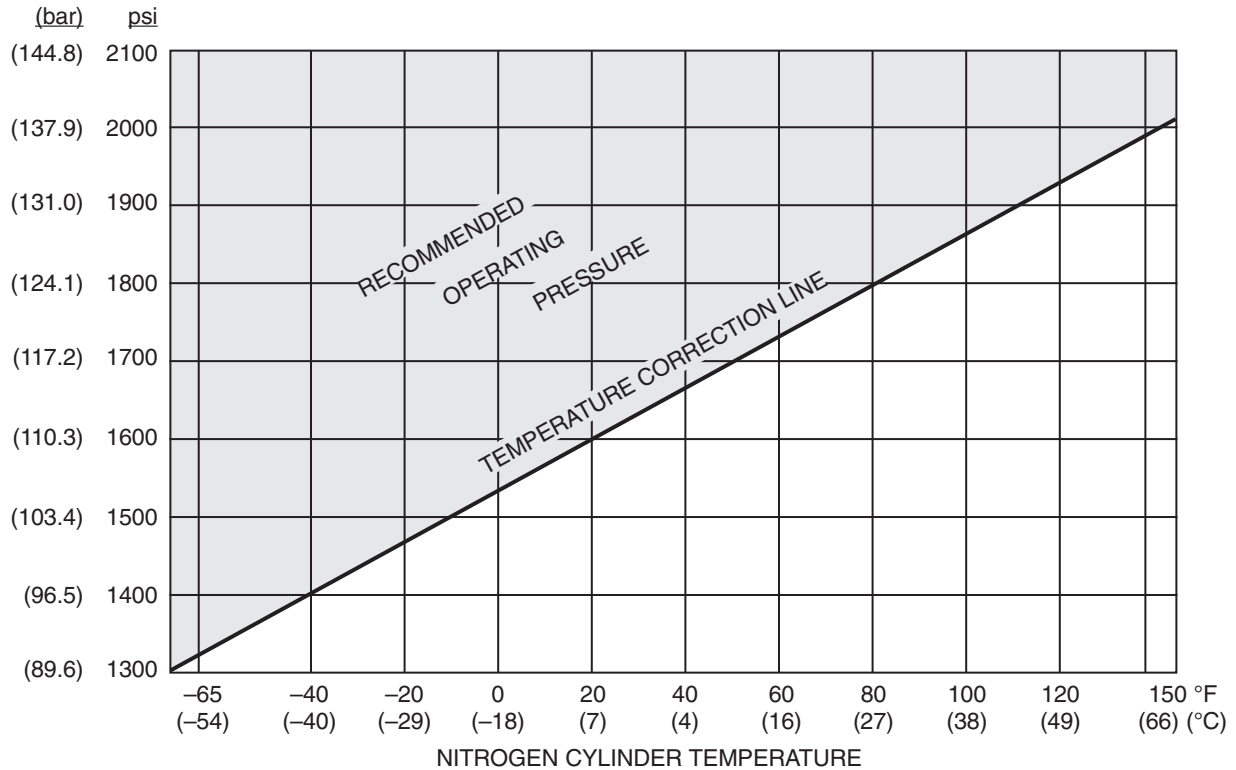
Examples:

1. The nitrogen cylinder on an ANSUL fire suppression system indicates a pressure of 1450 psi (100 bar) on the pressure gauge. The temperature of the cylinder is 40 °F (4 °C). Reference to the chart shows that this is above the "temperature correction line" and the cylinder does not need to be replaced.
2. One of the nitrogen cylinders of an ANSUL fire suppression system indicates a pressure of 1350 psi (93 bar) on the pressure gauge. The temperature of the cylinder is 80 °F (27 °C). Reference to the chart shows that this is below the minimum recommended pressure for this temperature. The cylinder should be replaced by a fully charged nitrogen cylinder.

TEMPERATURE CORRECTION CHARTS (Continued)

300/400 ft³ (8.49/11.32 m³) Cylinders

(Except for Cylinders on the AQUASONIC System)

CYLINDER
PRESSURE

Examples:

1. The nitrogen cylinder on an ANSUL fire suppression system indicates a pressure of 1800 psi (124.1 bar) on the pressure gauge. The temperature of the cylinder is 80 °F (27 °C). Reference to the chart shows that this is above the "temperature correction line" and the cylinder does not need to be replaced.
2. One of the nitrogen cylinders of an ANSUL fire suppression system indicates a pressure of 1600 psi (110.3 bar) on the pressure gauge. The temperature of the cylinder is 80 °F (27 °C). Reference to the chart shows that this is below the minimum recommended pressure for this temperature. The cylinder should be replaced by a fully charged nitrogen cylinder.

TEMPERATURE CORRECTION CHARTS

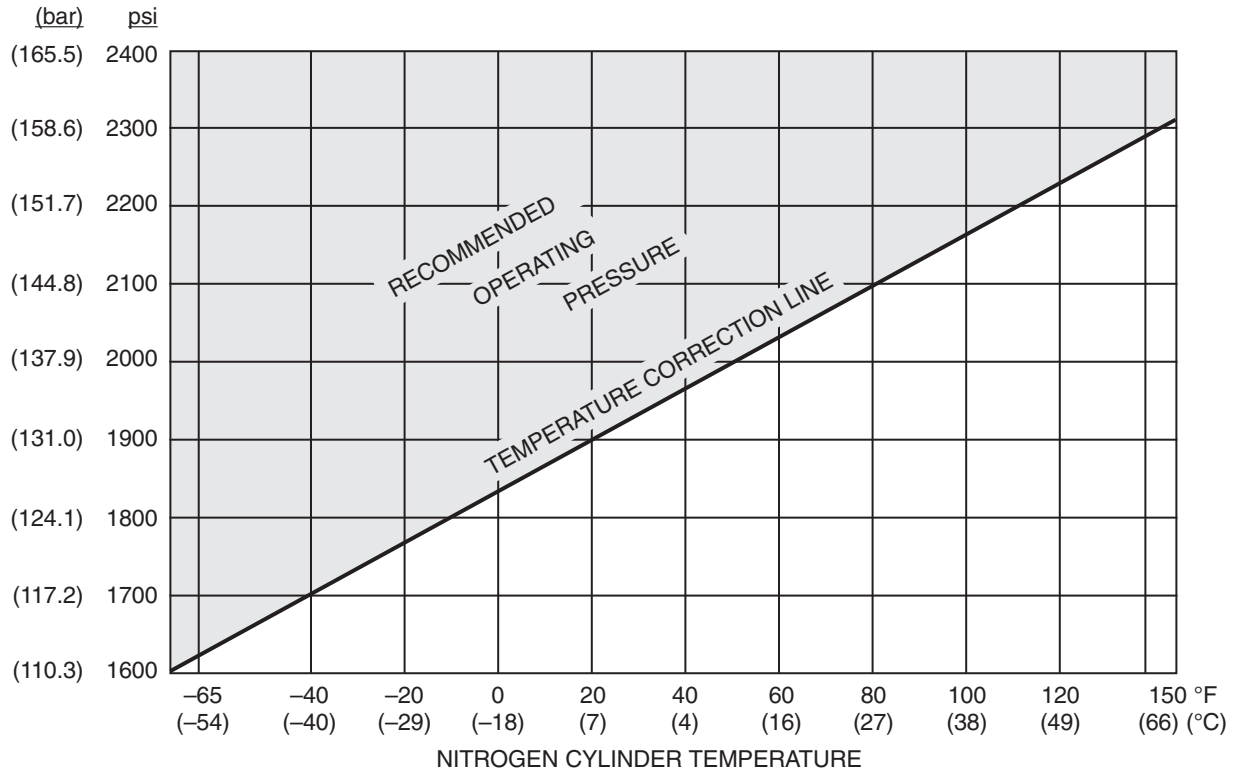
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TEMPERATURE CORRECTION CHARTS (Continued)

400 ft³ (11.32 m³) Nitrogen Cylinders for AQUASONIC System Only

The chart below has been prepared to assist users of ANSUL AQUASONIC equipment in determining that the cylinder being checked contains enough nitrogen to furnish a recommended operating pressure.

CYLINDER PRESSURE



Examples:

1. The nitrogen cylinder on an ANSUL AQUASONIC fire suppression system indicates a pressure of 2100 psi (144.8 bar) on the pressure gauge. The temperature of the cylinder is 80 °F (27 °C). Reference to the chart shows that this is above the "temperature correction line" and the cylinder does not need to be replaced.
2. One of the nitrogen cylinders of an ANSUL AQUASONIC fire suppression system indicates a pressure of 2000 psi (137.9 bar) on the pressure gauge. The temperature of the cylinder is 80 °F (27 °C). Reference to the chart shows that this is below the minimum recommended pressure for this temperature. The cylinder should be replaced by a fully charged nitrogen cylinder.

