SAE International™

# SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2383

REAF. JAN2004

Issued 1998-03
Reaffirmed 2004-01

## Air Dryer Installation Procedure

***1.*** ***Scope***—This SAE Recommended Practice establishes uniform Installation Parameters for desiccant Air Dryers for vehicles with compressed air systems.

***2.*** ***References***—There are no referenced publications specified herein

***3.*** ***Definitions***

**3.1** **Air Dryer**—A device that cools, filters, and dries the air delivered by an air compressor.

**3.2** **Compressor Load Cycle**—The time during which the air compressor is building air pressure in an air system.

**3.3** **Compressor Unload Cycle**—The time during which the air compressor is not building air pressure in an air system.

**3.4** **Desiccant**—A substance that adsorbs and desorbs moisture from air.

**3.5** **Discharge Line Unloaded Compressor (DLU)**—This version of air compressor has no integral unloading mechanism. Unloading is accomplished downstream of the compressor by releasing air from the discharge line through a valve or dryer, directly to the atmosphere.

**3.6** **Duty Cycle**—Compressor loaded time divided by engine on time.

**3.7** **Drying Cycle**—The time during which the air dryer cools, filters, and removes moisture from the air.

**3.8** **Integral Purge Air Dryer**—A dryer for which the air for regeneration is internal to the dryer.

**3.9** **Outlet Check Valve**—A valve that prevents downstream air from flowing back through the air dryer.

**3.10** **Pressure-Controlled Check Valve**—A valve which permits downstream air to flow back for purging in a System Purge Air Dryer while protecting reservoir pressure.

**3.11** **Purge Cycle**—The time during which the air dryer is undergoing decompression and regeneration.

**3.12** **Purge Tank Air Dryer**—A dryer for which the air for regeneration comes from a dedicated external reservoir.





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**3.13 Purge Valve—**A valve that allows the collected moisture and contamination to be expelled from the air dryer during the purge cycle.

**3.14 Regeneration—**The controlled backflow of air through the desiccant to remove moisture and contaminants.

**3.15 Regeneration Valve—**A valve that controls the amount of air from the air reservoirs that is used for regeneration in a System Purge Air Dryer.

**3.16 System Purge Air Dryer—**A dryer for which the air for regeneration comes from the air system reservoirs.

**3.17 Turbo Cut-Off Valve—**A valve that closes the dryer inlet during the compressor unload cycle to avoid engine turbocharge pressure loss.

## *4. Air Dryer Installation Parameters*

**4.1 Dryer Operating Requirements—**Operating Requirements are to be as follows except where the air dryer manufacturer specifies otherwise:

| | | |
|---|---|---|
| a. | Inlet Temperature | 71 °C (160 °F) typical max |
| b. | Governed Operating Pressure | 10.2 bar max (150 psig max) |
| c. | Ambient Temperature | –40 °C to 52 °C (–40 °F to 125 °F) |

### 4.2 Physical Parameters

4.2.1 PORT SIZE:

| | | |
|---|---|---|
| a. | Inlet Port | 1/2 NPT |
| b. | Outlet Port | 1/2 NPT |
| c. | Purge Tank Air Port | 1/4 NPT |
| d. | Control Port | 1/4 NPT |
| e. | Voltage | 12 or 24 V |

4.2.2 PORT IDENTIFICATION—Ports are to be permanently marked with one or more of the following port naming conventions. (See Table 1.)

**TABLE 1—PORT IDENTIFICATION**

| Word Label | Word Label Abbreviation | ISO Label |
|---|---|---|
| Inlet | IN | 1 |
| Outlet | OUT | 21 |
| Control | CON | 4 |
| Purge Tank | PT | 22 |

## 4.3 System Compatibility

4.3.1 SYSTEM PURGE DRYER SYSTEM

*4.3.1.1* A single check valve must not be used at the inlet of any reservoir used for regeneration air.

*4.3.1.2* A Pressure-Controlled Check Valve is required at the inlet of the protected reservoir(s) used for regeneration air.

*4.3.1.3* For dryers which control regeneration air via a pressure drop, Non-Flow-Sensitive Double Check Valves are required when Double Check Valves are used between the circuits of the air reservoirs.

4.3.2 DISCHARGE LINE UNLOADER SYSTEMS (DLU)—Most brands of Air Dryers are available in a DLU version which requires no added valving. If a DLU version is not available, a DLU valve must be added to the compressor discharge line. Check with the Air Dryer manufacturer.

4.3.3 PRESSURIZED DISCHARGE LINE SYSTEMS—Some Air Dryer models have a version which can be used with those Air Compressors which require a pressurized discharge line during unloaded operation. Check with the Air Dryer manufacturer.

## 4.4 Air Dryer Installation Guidelines

4.4.1 MOUNTING POSITION

*4.4.1.1* The air dryer should be mounted in a location with sufficient space around it to facilitate service and to provide visual access for periodic inspection.

*4.4.1.2* The air dryer should be mounted out of direct tire or wheel road splash or protected from splash.

*4.4.1.3* The air dryer, with its mounting bracket, lines, and fittings, should be mounted in a protected location such that minor mechanical damage to the vehicle will not damage the air system integrity.

*4.4.1.4* The air dryer must be mounted with the exhaust port downward.

*4.4.1.5* The air dryer should be mounted to avoid excessive heat sources.

*4.4.1.6* The air dryer must be mounted rigid enough to avoid vibration which could damage the desiccant or dryer.

4.4.2 MOUNTING—The air dryer mounting should conform to Figure 1 or Figure 2 and Table 2:

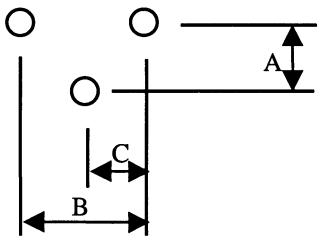


FIGURE 1—MOUNTING PATTERN

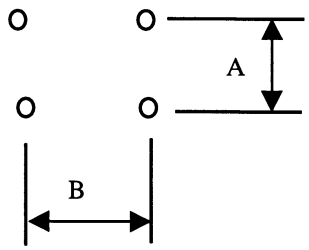


FIGURE 2—MOUNTING PATTERN

**TABLE 2—MOUNTING PATTERNS AND MOUNTING BOLTS**

| Figure | A mm | B mm | C mm | Bolt Size | Bolt Grade |
|---|---|---|---|---|---|
| 1 | 72 | 105 | 52.5 | M12x1.5 (1/2-13) | 8.8 (5) |
| 2 | 84.6 | 136 | na | M10x1.25 (3/8-20) | 8.8 (5) |

## 4.5 Lines and Fittings

4.5.1 AIR LINES

*4.5.1.1* To prevent moisture accumulation, the compressor discharge line should slope continuously downhill from the compressor to the dryer without any dips which exceed 1/2 the line diameter. If this is not possible, the line should run vertically straight upward at the compressor to a height that will permit a downhill sloping run to the dryer.

*4.5.1.2* The compressor discharge line size, length, and material must be such that the dryer inlet air temperature is typically no more than 71 °C (160 °F) or no less than 25 °C (45 °F) above low ambient (i.e., if ambient is –40 °C, the dryer inlet temperature must be above –15 °C). Lower dryer inlet air temperatures should be avoided to minimize the risk of freeze-up in the discharge line or dryer inlet fitting. Higher dryer inlet air temperatures should be avoided to minimize the risk of heat damage to the dryers' seals and/or to avoid a loss of drying performance. It is recognized that both limits may not be achievable at all extremes of ambient temperature and compressor duty cycle. Therefore, to protect from discharge line freeze-up, it is recommended that a pressure relief valve be installed near the compressor outlet, particularly on those vehicles which will not meet the low temperature limit at the dryer inlet.

4.5.2 FITTINGS—The use of restrictive fittings in the compressor discharge line should be avoided. These fittings impede the air flow and contribute to increased freezing potential. Avoid the use of 90 degree elbows, where possible.

**4.6 Electric Heater Connections—**Connection will be via a sealed and locked 2-pin connector. The male connector will be on the dryer and conform to the design in Figure 3. Vehicle wiring will provide slack and strain relief sufficient to prevent connector seal distortion. All wiring connections (i.e., splices) must be waterproofed. Power lead will be ON when the vehicle ignition is on and OFF when the ignition is off. Ground lead must be connected to the vehicle ground system, not grounded to the air dryer body.

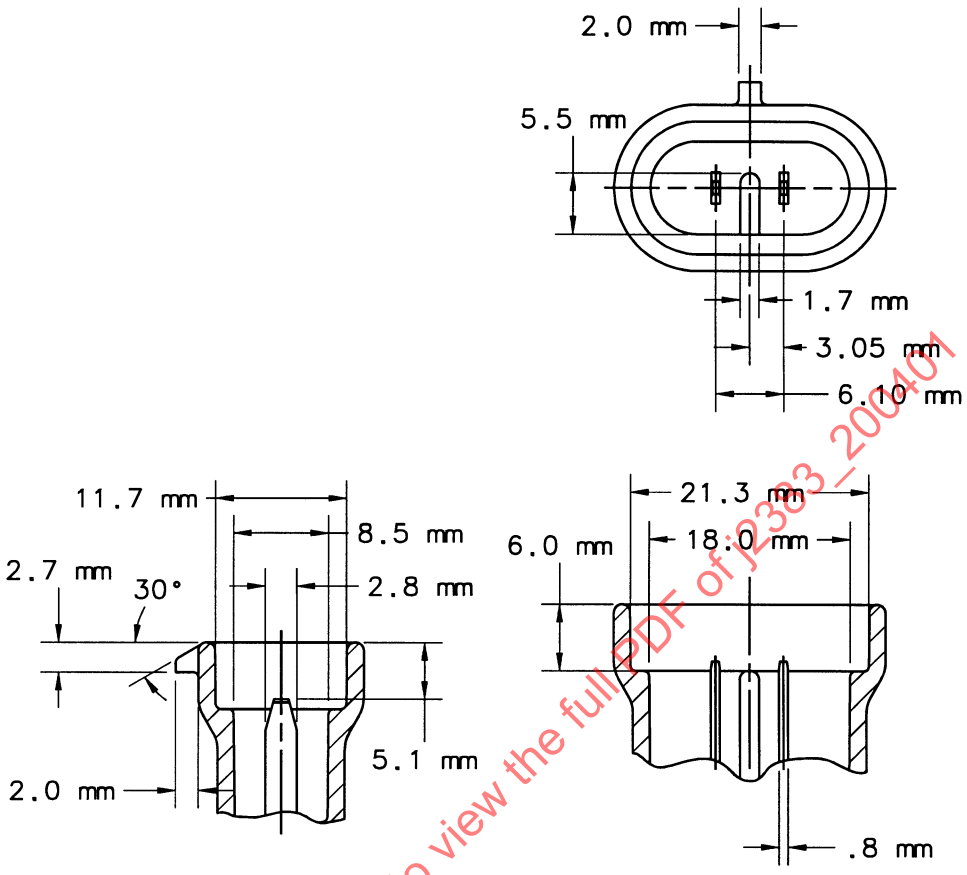


FIGURE 3—HEATER CONNECTOR DESIGN