



Genetron®

AZ-50 (R-507)

Retrofit

Guidelines

Fluorocarbons

As the industry moves away from the use of CFCs, refrigerant service personnel will play a key role in the transition to HFC alternatives through retrofitting. AlliedSignal has produced this booklet to help service technicians better understand the various technical and operational aspects of carrying out the retrofit procedures using AlliedSignal's new Genetron® AZ-50.

Although the information can be helpful as a general guide, it should not be used as a substitute for the equipment manufacturer's specific recommendations. For this reason, AlliedSignal strongly recommends contacting the equipment manufacturer for detailed information on retrofitting the specific model under consideration. Also, refer to the Material Safety Data Sheet (MSDS) for safety information on the use of Genetron AZ-50.

Genetron® AZ-50 (R-507)

Genetron AZ-50 (R-507) is a patented azeotropic (HFC 125/HFC-143a) designed to serve as a long-term alternative to R-502 and HCFC-22 in low- and medium-temperature commercial refrigeration applications. This product contains two HFCs and therefore is not scheduled for phaseout under current law. Applications where AZ-50 is a suitable retrofit refrigerant include supermarket freezer cases, reach in coolers, display cases and ice machines.

Genetron AZ-50: Not a "Drop in" Replacement

Genetron AZ-50 is not a "drop-in" replacement for R-502. Mineral oils and alkylbenzene lubricants, which have been used traditionally with R-502, are immiscible with AZ-50 and must therefore be replaced with new lubricants. The retrofit procedures listed here have been developed by AlliedSignal to address these issues and to help technicians perform successful retrofits of R-502 systems utilizing positive-displacement (reciprocating, rotary, scroll or screw) compressors with AZ-50.

Retrofit Procedures

1. Record Baseline Data

It is desirable to record system performance data prior to retrofit to establish the normal operating conditions for the equipment. Data should include temperatures and pressure measurements throughout the system, including the evaporator, compressor suction and discharge, condenser and expansion device. These measurements will be useful when adjusting the system with AZ-50 during the retrofit.

2. Isolate R-502 Charge

The R-502 charge should be isolated from the rest of the system by pumping it down into the receiver. If no receiver is present, the refrigerant must be removed from the system using a recovery machine capable of meeting or exceeding the required levels of evacuation. The charge must be collected in a recovery cylinder.

DO NOT VENT THE REFRIGERANT.

Knowing the recommended R-502 charge size for the system is helpful. If it is not known, weigh the entire amount of refrigerant removed. This amount can be used as a guide for the initial quantity of AZ-50 to be charged into the system.

3. Choose Compressor Lubricant

Mineral oil or alkylbenzenes are typically used as the lubricants for R-502 compressors. But, to achieve miscibility of the AZ-50 with the lubricant, a polyol ester must be used. AlliedSignal recommends using a polyol ester lubricant approved by the compressor manufacturer. Differences among polyol ester-based lubricants make it difficult to assume that they are interchangeable. Check with the compressor manufacturer for the correct viscosity grade and brand for the compressor in the system being retrofitted.

4. Drain the Lubricant

Since many small hermetic compressors do not have oil drains, removal of the compressor from the system may be necessary for draining the lubricant. The best point in the system to drain the lubricant is the suction line of the compressor. Remember that most of the oil must be removed from the system before adding the replacement lubricant.

For larger systems, the oil should be drained from multiple points in the system. Particular attention should be paid to low spots around the evaporator where lubricant often collects. The oil also should be drained from oil separators and/or suction accumulators.

5. Measuring Existing Lubricant

Measure and record the volume of lubricant removed from the system. Compare this amount with the amount recommended by the manufacturer to ensure that the majority of lubricant has been removed. This volume also will be used as a guide to determine the amount of polyol ester lubricant to add in the next step.

6. Recharge Compressor with Polyol Ester Lubricant

Add to the compressor the same volume of polyol ester lubricant as the volume of oil drained in step 5.

7. Reinstall the Compressor

Reinstall the compressor following the standard service practices recommended by the manufacturer.

8. Recharge the R-502

If the system charge was pumped into the receiver, the balance of the system should be evacuated and then the receiver valves opened. If the original charge was collected in a recovery cylinder, the system should be evacuated and then recharged with the original R-502. It may be necessary to "top off" the refrigerant charge to compensate for the small amount lost in draining the oil.

9. Run the Compressor

Run the compressor with the polyol ester lubricant and the R-502 for at least 24 hours. Next, drain the polyol ester and recharge with fresh polyol ester. Check the lubricant that was drained. Be sure the residual oil content is below 5%. Test kits are available from several lubricant suppliers for this purpose. It usually requires about three charges to get the oil content under 5%.

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10. Continue to Flush the System

Repeat steps 4 through 9 until the residual oil content is below 5%. The lubricant that was removed from the compressors in the flushing procedure must be disposed of properly.

11. Evaluate the Expansion Devices

Most R-502 systems with any of the common expansion devices will operate satisfactorily with AZ-50; however, it may be necessary to adjust the superheat. AlliedSignal recommends consulting with the equipment manufacturer whenever possible.

12. Replace the Filter Drier

Following system maintenance, a recommended service practice is to replace the filter drier. There are two types of filter driers commonly used in refrigeration equipment—loose-fill and solid-core.

Many, but not all, of the standard loose-fill and solid-core driers used with R-502 are compatible with AZ-50. Check with your wholesaler to make sure the replacement filter drier being used is compatible with AZ-50.

13. Reconnect the System and Evacuate

Use normal service practices to reconnect and evacuate the system. To remove air and other non-condensibles, AlliedSignal recommends evacuating the system to a full vacuum of 1,000 microns or less from both sides of the system. However, attempting to evacuate a system with the pump connected to only the low side of the system will not adequately remove moisture and non-condensibles such as air. Use a good electronic gauge to measure the vacuum. An accurate reading cannot be made with a refrigeration gauge.

14. Check for System Leaks

Check the system for leaks using normal service practices.

5. Charge System with Genetron® AZ-50

When charging the system with AZ-50, use the same charging procedures that you would use for R-502 to insure optimal system performance.

Systems being charged with AZ-50 require a smaller charge size than those using R-502. The charge typically will be about 85 percent by weight of the original R-502 charge with expansion-valve or optimized apillary systems.

AlliedSignal recommends initially charging the system with 75 percent by weight of the original R-502 charge. For medium-temperature refrigeration applications, if the original R-502 charge was 100 pounds (50 Kg), initially charge 75 pounds (37.5 Kg) of AZ-50. If the original R-502 charge was 300 grams, initially charge 225 grams of AZ-50.

6. Check System Operation

Start the system and let conditions stabilize. If the system is undercharged, add additional AZ-50 in increments of 5 percent by weight of the original R-502 charge. For example, if the original charge was 100 pounds (50 Kg), charge in increments of 5 pounds (2.5 Kg). If the original charge was 300 grams, charge in increments of 15 grams. Continue until desired operating conditions are achieved.

Compressor-suction pressures for AZ-50 after stabilization should be within about 2 psi (15 kPa) of normal system operation with R-502 for most medium- and low-temperature systems. Compressor-discharge pressures typically will be about 18-25 psi (125-170 Pa) higher than normal system operation with R-502. It may be necessary to reset the high pressure curout to compensate for the higher discharge pressures of the AZ-50 system. This procedure should be done carefully to avoid exceeding the recommended operating limits of the compressor and other system components.

To avoid overcharging, it is best to charge the system by first measuring the operating conditions including discharge and suction pressures, suction

line temperature, compressor amps, super heat) before using the liquid-level sight glass as a guide.

17. Label Components and System

After retrofitting the system with AZ-50, label the system components to identify the type of refrigerant (Genetron® AZ-50) and specify type of polyol ester lubricant (by brand name) in the system. This will help ensure that the proper refrigerant and lubricant will be used to service the equipment in the future.

1. Record baseline data on original system performance. _____
2. Recover R-502 refrigerant charge using appropriate recovery equipment or pump down into receiver.
* Record the amount of R-502 removed. _____
3. Choose compressor lubricant. _____
4. Drain as much of the lubricant from the compressor as possible. _____
5. Measure amount of lubricant removed. _____
6. Recharge compressor with polyol ester lubricant.
* Use the same amount that was removed from the existing system. _____
7. Reinstall compressor. _____
8. Recharge the System using the original R-502. _____
9. Run the System. _____
10. Repeat Flushing Procedure until 99% pure POE oil. (steps 4-9) _____
11. Evaluate expansion device. _____
12. Replace filter drier with new drier approved for use with Genetron AZ-50. _____
13. Reconnect system and evacuate. _____
14. Charge system with Genetron AZ-50.
Use correct charge size.
* Initial charge 75 percent by weight of original R-502 charge.
* Record amount of refrigerant charged. _____
15. Check system for leaks. (Re-evaluate system following leak check) _____
16. Check system operation.
* Adjust charge to achieve desired operating conditions.
* If low, charge in increments of 5 percent of original R-502 charge.
* Record the amount of refrigerant added. _____
17. Label components and system for type of refrigerant, i.e. Genetron AZ-50 and lubricant (by brand name). _____

Genetron® AZ-50 (R-507) Temperature/Pressure Tables

Temp °F	Pressure Psi
-60	5.8
-55	2.2
-50	0.9
-45	3.1
-40	5.5
-35	8.2
-30	11.1
-25	14.4
-20	17.9
-15	21.7
-10	25.9
-5	30.4
0	35.3
5	40.5
10	46.2
15	52.3
20	58.8
25	65.8
30	73.3
35	81.3
40	89.8
45	98.9
50	108.6
55	118.9
60	129.8
65	141.4
70	153.6
75	166.6
80	180.3
85	194.9
90	210.2
95	226.4
100	243.6
105	261.6
110	280.7
115	300.8
120	322.0
125	344.3
130	367.8
135	392.6
140	418.8
145	446.3
150	475.3
155	505.9

Temp °C	Pressure kPag
-50	15
-48	6
-46	4
-44	14
-42	26
-40	38
-38	51
-36	65
-34	80
-32	96
-30	113
-28	131
-26	151
-24	171
-22	193
-20	216
-18	240
-16	266
-14	293
-12	321
-10	352
-8	383
-6	417
-4	452
-2	488
0	527
2	567
4	610
6	654
8	700
10	749
12	799
14	852
16	907
18	965
20	1025
22	1087
24	1152
26	1220
28	1291
30	1364
32	1440
34	1520
36	1603
38	1689
40	1778
42	1871
44	1968
46	2068
48	2172
50	2280
52	2393
54	2509
56	2631
58	2756
60	2887
62	3023
64	3164
66	3310
68	3462
70	3619

Notes:

1. * inches of mercury vacuum