

**DESCRIPTIVE, ORDERING, INSTALLATION,
AND MAINTENANCE INFORMATION**

**DATA SHEET
RAF[®]
PURIFIER CHAMBERS
AND
PURIFIER
CARTRIDGES**



No. 3.105 B

PURIFIER CHAMBERS

RAF[®] Purifier Chambers are pressure vessels designed for use with a companion RAF[®] Purifier Cartridge to remove water, oil vapors, and gaseous contaminants from pressurized air or gases — such as oxygen, nitrogen, hydrogen, helium, argon, etc.

RAF[®] Purifier Chambers, together with RAF[®] Mechanical Filters, are the major components of RAF[®] Purification Systems. The Chambers are installed in the flow path downstream of the Mechanical Filter, whose function it is to remove solid particles and liquid contaminants, thus lessening the load on the downstream Purifier Cartridges and increasing their efficiency and life span.

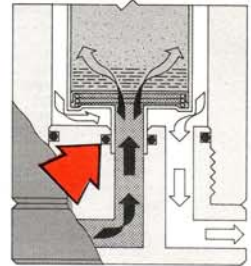
Single Purifier Chambers, with an appropriate Cartridge, also have a number of other uses:

- Downstream of an RAF[®] Purification System when an especially low moisture content is desired — particularly in the case of Systems utilizing a Cartridge containing a catalyst for carbon monoxide elimination.
- Close to the point of usage as a "booster" purifier station in a long supply line following an RAF[®] Purification System. Depending on line length, more than one such secondary purifier may be necessary.
- For additional purification of dry commercial-grade gases, such as nitrogen. More than one Chamber may be needed to achieve required purity levels.

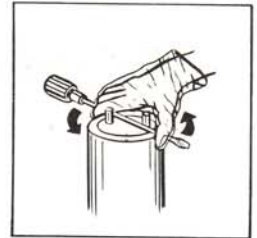
Single Purifier Chambers, without Cartridge, are also ideal for use as small high pressure receivers.

RAF[®] Purifier Chambers have been designed with special emphasis on the elimination of blind cavities that might entrap impurities. A unique feature is the single balanced-pressure O-ring that provides a bypass-proof seal between the Chamber and the Cartridge at the inlet, and prevents contaminants from going downstream or being deposited on the Chamber walls. The Chambers are designed to conform to the ASME Code for Unfired Pressure Vessels even though, because they are less than six inches in diameter, they do not fall within the Code's jurisdiction.

RAF[®] Purifier Chambers are available in several pressure ratings and in two lengths; some models are aluminum, while others are steel alloy (see Table II). The aluminum models, because of their light weight and corrosion resistance, are especially well suited for airborne and marine use, or other applications in which either or both of these factors are important considerations.



Leakproof trouble-free operation



Ease of maintenance—no special tools

TYPICAL MODELS



RAF-65B



RAF-35SP

PURIFIER CARTRIDGES

RAF[®] Purifier Cartridges are the functional components used in RAF[®] Purifier Chambers. The Cartridges are constructed of specially milled hot dip tinplate (MRT-3), and contain one or more active materials, each of which effects a special kind or degree of purification.

Cartridge efficiency and capacity is dependent upon a number of variables such as contaminant concentration in the input air or gas, regularity and quality of maintenance, and operating conditions such as pressure, temperature, and flow rate. Higher pressures and/or lower temperatures prolong cartridge life, while lower pressures and/or high temperatures reduce it (see Table V). Similarly, slower flow rates contribute to cartridge life and efficiency by permitting a longer "dwell time" of the fluid medium through the adsorbent bed. Thus maximum efficiency is achieved when flow rate is no greater than 20 SCFM.

Cartridges come in two sizes (though not all models are available in both sizes): "B" size (short) for use in "B" size Purifier Chambers, and "SP" size (long) for use in "SP" size Purifier Chambers.

Major characteristics and usage of the various RAF[®] Purifier Cartridges are as follows:

Type 13X Cartridges strongly adsorb most of the contaminants commonly present in air and inert gases. Thus, these Cartridges are capable of reducing moisture content to a —100°F dewpoint, and simultaneously capable of removing gaseous hydrocarbons to less than 1 PPM/w (hexane equivalent) and most common noxious gases (except carbon monoxide) to levels undetectable by practical means.

Charcoal Cartridges contain a high grade of activated carbon and are primarily used for odor removal, though they are also effective in adsorbing oil vapors and a number of other contaminants.

Between them, Type 13X and Charcoal Cartridges remove not only the contaminants already mentioned, but are also effective in removing most organic vapors and many inorganic compounds. They are highly effective in removing acrylonitrile, vinyl chloride, halogenated solvents, nitrogen oxides, and sulfur compounds — all of which present a serious health hazard in respiratory air, and some of which are recognized carcinogens. Both the above Cartridges come in "B" and "SP" sizes.

Catalyst Cartridges are available in "B" size only and are used in Series 8197 RAF[®] Respiratory Systems. These Cartridges contain a granular mixture of specially prepared oxides, which are highly

(Continued on Page 2)

RAF-BCD13X



RAF-BCDAC



RAF-SPT13X





PURIFIER CHAMBERS

TABLE I TECHNICAL DATA

Safety Factor: 4:1 (ASME Code)
 Operating Temperature:
 Maximum: See Table IV
 Minimum: +40°F
 O-ring material: Buna-N
 Orifice diameter: 5/16"
 Cylinder Leakage: Zero
 Capacity (empty)
 "B" size Chambers 68 cu. in.
 "SP" size Chambers 178 cu. in.

Port Connections:
 3/8" fem. tube SAE, St. Thd. O-ring boss (interchangeable with AND10050-6, MC240-6, MS16142-3/8, & MS33649-6)

Fittings:
 To connect 3/8" female tube to line tubing, use straight thread O-ring tube fittings such as Parker's "Triple-lok" F5BX Series. Chambers may also be connected to 1/4" heavy wall pipe with female NPT tapered pipe threads using standard high pressure adapter fittings such as manufactured by Parker, Weatherhead, Imperial Eastman, etc.

TABLE II ORDERING INFORMATION

	MODEL NO.	MATERIAL	MAX OPER PRESSURE PSI	APPROX WEIGHT
"B" SIZE	RAF-35B	Aluminum	3500	10
	RAF-65B	Steel Alloy	6500	45
	RAF-8AB	Steel Alloy	8000	45
	RAF-10AB	Steel Alloy	10000	45
"SP" SIZE	RAF-35SP	Aluminum	3500	20
	RAF-65SP	Steel Alloy	6500	84
	RAF-8ASP	Steel Alloy	8000	84
	RAF-10ASP	Steel Alloy	10000	84

Note: For Purifier Chambers with reverse flow path, add letter R to Model Number.

NOTICE-

The use of other than RAF® brand Purifier Cartridges in RAF® Purifier Chambers voids the warranty on said Purifier Chambers; and absolves this Company from any and all responsibility for non-performance or malfunction of such Chambers as well as from any damage or injury to persons or property which might result through the use of such imitation cartridges in said RAF® Purifier Chambers.



PURIFIER CARTRIDGES

TABLE IV ORDERING INFORMATION AND TECHNICAL DATA

	MODEL NO.	TYPE	ACTIVE MATERIAL		REMOVES OR ELIMINATES	CAPACITY AT +70°F	MAX. OP. TEMP. (°F)	APPROX. GROSS WEIGHT (LB.)	APPROX. SHPG. WT. PER CASE** (LB.)
			NAME	MIN. WT. (LB.)					
"B" SIZE (Approx. 10" long)	RAF-BCD13X	13X	Molecular Sieves	0.94	Water Vapor Oil Vapor Noxious Gases*	20% Water 6% Oil	+200	1.46	11
	RAF-BCDAC	Charcoal	Activated Carbon	0.77	Odors Oil Vapor	10% Oil	+150	1.29	10
	RAF-BCDHI	Catalyst	Catalyst	1.64	Carbon Monoxide	—	+200	2.16	13
	RAF-BCO	Filter	Mesh Filter	—	Particles Oil Vapor	0.25 Lb. Oil	+200	0.62	7
"SP" SIZE (Approx. 25" long)	RAF-SPT13X	13X	Molecular Sieves	2.37	Water Vapor Oil Vapor Noxious Gases*	20% Water 6% Oil	+200	3.52	28
	RAF-SPTAC	Charcoal	Activated Carbon	2.18	Odors Oil Vapor	10% Oil	+150	3.33	26
	RAF-SPTC1	Combination	Molecular Sieve, 13X	1.25	Water Vapor Oil Vapor Noxious Gases*	20% Water 6% Oil	+150	4.0	28
			Activated Carbon Catalyst	0.77 0.55	Odors Carbon Monoxide	—			
	RAF-SPTC2	Combination	Molecular Sieve, 13X	2.55	Water Vapor Oil Vapor Noxious Gases*	20% Water 6% Oil	+150	3.75	34
			Activated Carbon	0.70	Odors	—			
	RAF-SPTC3	Combination	Activated Carbon	1.88	Oil Vapor Odors	10% Oil	+150	3.75	26
			Catalyst	0.94	Carbon Monoxide	—			
	RAF-SPTC4	Combination	Molecular Sieve, 13X	1.50	Water Vapor Oil Vapor Noxious Gases*	20% Water 6% Oil	+150	28	28
			Activated Carbon	1.38	Odors	—			
	RAF-SPTC5	Combination	Activated Carbon Catalyst	1.25 2.38	Oil Vapor Odors Carbon Monoxide	10% Oil	+150	34	34

* Except carbon monoxide.

** Cartridges are packaged 6 to a case.

CURRENT MANUFACTURERS' NET PRICE LIST AVAILABLE UPON REQUEST

(continued)

effective in eliminating deadly carbon monoxide through conversion to carbon dioxide, provided the air stream has a moisture content no greater than a -50°F dewpoint. Since the catalyst becomes ineffective when exposed to a greater moisture, it is absolutely essential to replace this Cartridge and the other Cartridges in the System on a regular basis or whenever excessive moisture is suspected. This practice is equally essential with regard to the odd-numbered Combination Cartridges described below, which also contain catalyst for carbon monoxide removal.

Combination Cartridges, as their name implies, contain more than one active ingredient. They are available in "SP" size only.

Combination 1 contains a certain amount of all three of the active materials already described, and will eliminate excess moisture, odors, gaseous hydrocarbons, and noxious gases including carbon monoxide. This Cartridge is designed for use in RAF® Purifier Towers for Respiratory Air.

Combination 2 is designed for use in RAF® Towers for Non-Respiratory Air and Gases. Thus, it contains the two basic adsorbents, but no catalyst, and will perform the same function as Combination 1 except for carbon monoxide elimination.

Combination 3 contains activated carbon and catalyst, and is generally used

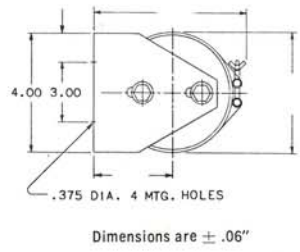
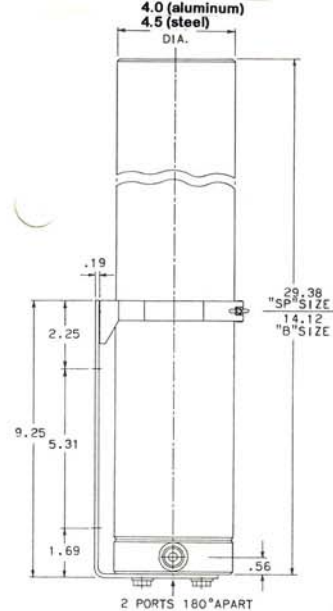
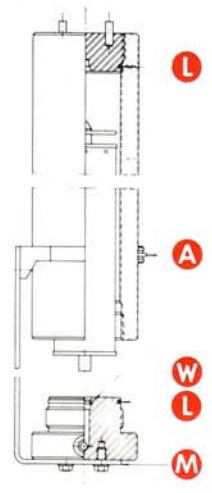


TABLE III REPLACEMENT PARTS FOR PURIFIER CHAMBERS

	ITEM	PART NO.
M	Bracket for RAF-6ASP	A826
M	Bracket for any other model	A825
A	Clamp	10412
	O-ring Kit (consists of 1 Intake O-ring and 2 Chamber O-rings)	4531
W	Intake O-ring only	5112-51
L	Chamber O-ring only	5232-51



Minimum clearance required for servicing (when not panel-mounted on an RAF® Purification System)

"B" size - 12" upward at plug end (top).
 "SP" size - 26" upward at plug end (top).

MAINTENANCE

O-rings should be regularly inspected and replaced when worn. This can be done in conjunction with Cartridge replacement (see Page 4). Both Chamber ends (Head and Plug) may be removed for easy visibility and access to all surfaces. When reassembling, be sure to match single and double index lines on cylinder with corresponding index lines on Head and Plug. Screw in all the way, and then back off until index lines match. **Do not tighten beyond index lines.**

MAIN ASSEMBLY PARTS ARE **NOT INTERCHANGEABLE**. If more than one Chamber is serviced, make sure Head and Plug are reinstalled on the same cylinder from which they were removed.



as the last downstream Cartridge in RAF® Respiratory Air Purification Systems that have three "SP" size Purifier Chambers.

Combination 4 contains the same active materials as Combination 2, but in different proportions.

Combination 5 contains the same active materials as Combination 3, but in different proportions.

Both Combination 4 and Combination 5 Cartridges are primarily designed for use in the high-capacity RAF® Series 8710 Modular Purification Systems.

Filter Cartridges contain a series of layers of microporous mesh filter material and are designed for filtration of solid particulates to approximately 0.3 micron (nominal), though they are also effective for oil vapor removal. They are available in "B" size only and are used in RAF® Non-Respiratory Air Purification Systems in the last downstream Purifier Chamber, which is usually plumbed "in reverse" so as to achieve maximum particle filtration. (Such Purifier Chambers are identified by a suffix "R" in the model number.)

REGARDLESS OF TYPE, ALL THE CARTRIDGES IN A PURIFICATION SYSTEM SHOULD BE REPLACED AT ONE TIME. FREQUENCY OF REPLACEMENT DEPENDS ON OPERATING CONDITIONS AND THE TYPE OF SYSTEM IN WHICH THEY ARE USED. PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR EACH SYSTEM.

TABLE V CAPACITY OF PURIFIER CARTRIDGES

System Pressure (PSIG)	Total Quantity (SCF) of Water-Saturated Air at 80°F Each Type 13X Cartridge Can Dry to -100°F Dewpoint	
	"B" Size	"SP" Size
0*	110	350
135	1,100	3,500
600	4,500	14,500
1,000	6,500	20,500
2,000	10,500	33,000
3,000	13,500	42,500
3,500	14,500	45,000
4,000	15,500	50,500
5,000	17,500	57,500
6,000	19,000	63,500
7,000	20,500	68,000
8,000	21,500	71,500
9,000	22,500	74,000
10,000	23,000	75,500

*14.7 PSIA

NOTES:

1. For every 20°F decrease in temperature of entering air, the dehydrating capacity is doubled. For every 20°F increase in entering air, capacity is cut in half.
2. To remove oil vapor and hydrocarbons from dry bottled gas that has been boosted in pressure by a lubricated compressor, the capacities given can be multiplied by 1.5 for nitrogen and 7 for helium.
3. To remove moisture from bottled gas that is already at -50°F dewpoint, multiply capacity figures by 10.

CARTRIDGE INSTALLATION AND REPLACEMENT

A Purifier Chamber must never be put in service without first having a Purifier Cartridge installed in it. An initial Cartridge is always supplied with Purifier Towers, and an initial set of Cartridges is supplied with Purification Systems.

All RAF® Cartridges are of the disposable type and must be replaced before they are spent. Operating with a spent (ineffective) Cartridge will result in contamination of the Chambers, of the lines, and of the equipment downstream. If the medium is air intended for human respiration, the results can be not only serious but fatal.

Because of the many variables involved, it is impossible to estimate Cartridge life accurately. For this reason a color-change Moisture Indicator is available for determining the approximate degree of Cartridge saturation while the system is in operation. A Data Sheet on this instrument is available upon request.

Cartridges come individually sealed in special polyethylene bags, which not only keep the Cartridges dry and clean until just before use, but also make it possible to handle the Cartridge through the bag during installation, thus preventing possible contamination from the operator's hands.

The sealed Cartridges should be visually inspected before installation; broken seals indicate possible contamination and premature exposure to moisture. Cartridges containing molecular sieves are vacuum-sealed and may go "out of round" if roughly handled during shipment. Acceptable roundness usually returns when the Tube Seal Cap is removed just prior to installation. Refer to the Acceptable Roundness specification on this page.

Cartridge replacement is quickly and easily accomplished without special tools. Step-by-step instructions for replacement of both "B" size and "SP" size Cartridges are given on this page and on the nameplate affixed to each Purifier Chamber itself.

When replacing Cartridges in a Purification System, all the Cartridges in the System should be replaced at the same time; the Indicator Capsule in the Moisture Indicator should be replaced at that time also.

INSTRUCTIONS FOR INSTALLING RAF® PURIFIER CARTRIDGES IN RAF® PURIFIER CHAMBERS

IMPORTANT: EXTREME CLEANLINESS AT EVERY STEP OF CARTRIDGE REPLACEMENT IS ESSENTIAL. A little extra care in this regard will enhance performance and reduce maintenance.

COMPLETE CARTRIDGE REPLACEMENT IN ONE PURIFIER CHAMBER BEFORE PROCEEDING TO THE NEXT. This will reduce possibility of contamination and ensure that Body or Plug is reinstalled on the same Chamber from which it was removed, as main assembly parts are **NOT** interchangeable.

"B" SIZE

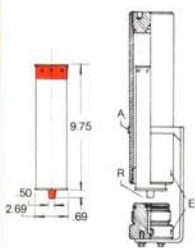
(Approx. 10 inches long)

1. **RELEASE PRESSURE SLOWLY TO PREVENT CONDENSATION ON INTERIOR OF CHAMBER (see Note). DEPEND ON RELATIVE HUMIDITY OF ATMOSPHERE, ALLOW 15 MINUTES TO ONE HOUR AFTER BLEEDING SYSTEM SLOWLY DOWN TO ZERO PRESSURE BEFORE OPENING CHAMBER FOR CARTRIDGE REPLACEMENT.**
2. Wipe off top of Chamber with clean lint-free cloth.
3. Unlock Retainer Clamp (A) and unscrew Purifier Chamber Body from Chamber Head, using a strap wrench if necessary. Set Body aside on a clean surface. Remove and discard spent Cartridge.
4. Lubricate lightly Plug O-rings and threads with an inert lubricant.*
5. **WHILE HANDLING CARTRIDGE THROUGH BAG SO AS TO PREVENT HAND CONTACT:**
 - a. Open bag at both ends.
 - b. Using a clean sharp knife, lift end of sealing tape that covers exhaust holes on all Cartridges (except RAF-BCO Filter Cartridge). Pull off and discard the tape.
 - c. Similarly remove Seal Cap from Cartridge Tube (R).
 - d. Lubricate* Cartridge Tube lightly.
 - e. Still holding Cartridge through bag, insert Cartridge Tube (R) in center opening at Chamber Head until it is securely seated in the O-ring. Rotate Cartridge slightly in both directions to effect a seal between the Tube and the O-ring. Remove and discard plastic bag.
6. Slide Chamber Body over Cartridge and screw it on to Chamber Head as far as it will go; then back off until index lines (E) match. **DO NOT TIGHTEN BEYOND THIS POINT.**
7. Close and lock Retainer Clamp.
8. **PRESSURIZE SLOWLY.** High pressure surge will damage Cartridge.

"SP" SIZE

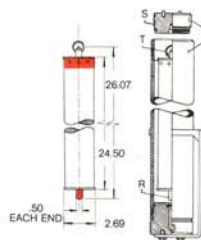
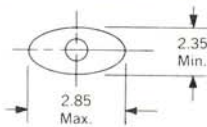
(Approx. 25 inches long)

1. **RELEASE PRESSURE SLOWLY TO PREVENT CONDENSATION ON INTERIOR OF CHAMBER (see Note). DEPEND ON RELATIVE HUMIDITY OF ATMOSPHERE, ALLOW 15 MINUTES TO ONE HOUR AFTER BLEEDING SYSTEM SLOWLY DOWN TO ZERO PRESSURE BEFORE OPENING CHAMBER FOR CARTRIDGE REPLACEMENT.**
2. Wipe off top of Chamber with clean lint-free cloth.
3. Unscrew Plug (S) from Purifier Chamber body, setting it aside on a clean surface.
4. Rotate spent Cartridge slightly in both directions to break the seal between the Cartridge Tube (R) and the Chamber O-ring. Using Extractor Ring (T), pull spent Cartridge straight up and discard it.
5. Lubricate lightly Plug O-rings and threads with an inert lubricant.*
6. **WHILE HANDLING CARTRIDGE THROUGH BAG SO AS TO PREVENT HAND CONTACT:**
 - a. Open bag at both ends.
 - b. Using a clean sharp knife, lift end of sealing tape that covers exhaust holes. Pull off and discard the tape.
 - c. Similarly remove Seal Cap from Cartridge Tube (R) and discard it.
 - d. Lubricate* Cartridge Tube lightly.
 - e. Holding Cartridge by Extractor Ring (but still through bag), insert Cartridge into Chamber Body until Cartridge Tube (R) is securely seated in O-ring at Chamber Head. Rotate Cartridge slightly in both directions to effect a seal between the Tube and the O-ring. Discard plastic bag.
7. Screw Plug into Chamber Body as far as it will go; then back off until index lines (E) match. **DO NOT TIGHTEN BEYOND THIS POINT.**
8. **PRESSURIZE SLOWLY.** High pressure surge will damage Cartridge.



* Halocarbon 25-5S is used at the factory.
Lubricant must be clean and free from contamination.

ACCEPTABLE ROUNDNESS SPECIFICATION for Type 13X and Combinations 1, 2 & 4 Cartridges, which are vacuum-sealed.



Note: Condensation of moist air on interior surfaces of the Chamber introduces needless contamination and may also reduce the effectiveness of newly installed Cartridge.

ALTA-ROBBINS

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WARRANTY: Alta-Robbins warrants to the purchaser of its products that any part thereof which proves to be defective in material or workmanship within one year from the date of original purchase for use will be replaced free of charge. This warranty does not apply to damages resulting from accidents, alterations, misuse, or abuse.

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