INSTRUCTIONS FOR CONTINUED AIRWORTHINESS STC SR01373SE

1130 SERIES-ICA-1

ENGINE INLET AIR FILTER SYSTEM

EUROCOPTER EC130 B4 SERIES HELICOPTERS

This supplement must be attached to the applicable Eurocopter EC130 B4 series helicopters, FAA Approved Maintenance Manual when the Engine Filtration System, P/N 1130IN1-1 is installed in accordance with Supplemental Type Certificate (STC) SR01373SE. The information in this manual supplements or supersedes the basic manual only in those areas listed.

REVISION: A 04/20/11

RECORD OF REVISIONS

REV	DATE	DESCRIPTION	BY
IR	12/23/03	Initial Release	
A	04/20/11	• Extensively revised format • Replaced INTEC with FDC/aerofilter • §1.1: Fixed grammar typos • §1.5: Revised Abbreviations • §1.6: Deleted registration. Updated contact information • §2.0: Deleted Life Limit of filter element • §3.1 & 3.2: Revised Service Intervals • §4: Extensively revised Servicing Info and Maintenance Instructions	DN

LIST OF EFFECTIVE PAGES

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1.0 Introduction

1.1 General Product Information

The Eurocopter EC130 B4 Engine Filter System consists of a duct assembly, a filter element, low inlet pressure annunciator system, and a pilot actuated alternate air system. It is designed to protect the turbine engine from foreign object damage and erosion due to fine particulate when operating in normal and dusty environments. A specially formulated polymerized oil, suspended by a pleated wire cloth and fabric matrix, attracts and holds dust particles within the filter element. It is serviced by cleaning and re-oiling at regular intervals or as required.

A pilot actuated alternate air system is provided to bypass the filter element in the event that filter blockage exceeds a pre-selected level demonstrated in FDC/aerofilter flight tests. The alternate air system should be inspected at regular intervals as part of the operator maintenance program.

1.2 Scope of ICA

This manual describes the airworthiness limitations, service instructions, inspection procedures and testing of the engine filter systems and its individual components. Strict adherence to the information given herein will assure maximum filtration benefit and increased component life.

1.3 Applicability

Eligible EC130 B4 models for the installation of the Filter System:

Model	Engine	Installation
EC130 B4	Turbomeca Arriel 2B1	Factory

1.4 Precautions

The following precautions are used throughout this manual and are defined as follows:

WARNING: Maintenance procedure, practice, condition, etc. which if ignored could result in personal injury or loss of life.

CAUTION: Maintenance procedure, practice, condition, etc. which if ignored could result in damage or destruction of equipment.

NOTE: Maintenance procedure, practice, condition, etc. or a statement which needs to be highlighted.

1.5 Definitions, Abbreviations, Acronyms and Symbols

The following are used throughout the manual.

AC	Advisory Circular
ΔP	Differential Pressure
fl. oz.	Fluid Ounce
FOD	Foreign Object Damage
ICA	Instructions for Continued Airworthiness
in-H_2O	Inches of Water (Pressure)
STC	Supplemental Type Certificate

1.6 Distribution

From time to time, it may be necessary to revise or update information contained in this ICA. Although best efforts will be made to distribute revisions and updates to the registered owner of the product, it is ultimately the responsibility of the current user to ensure he or she is using the most current information available. When revised pages are received, insertions should be logged on the *Record of Revisions* page and the *List of Effective Pages* log should be updated.

Additional copies of this and other related documents, as well as revisions and updates may be obtained by contacting the following:

FDC/aerofilter
3920 Sandstone Dr.
El Dorado Hills, CA 95762
Tel: 415-884-0555
Fax: 415-883-8071
Toll Free (US & Canada): 800-350-6674

24/7 Technical Support Line: 415-328-3725

http://www.fdcaerofilter.com

2.0 Airworthiness Limitations

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §43.16 and §91.403 of the Federal Aviation Regulations unless an alternate program has been approved.

There are no airworthiness limitations associated with this Supplemental Type Certificate.

3.0 Inspection/Test Requirements

3.1 General

These sections cover the basic maintenance and service requirements necessary for safe operation and continued airworthiness of the FDC/aerofilter Inlet Barrier Filter System. The service and inspection intervals designated herein are the maximum recommended and should not be exceeded.

3.2 Service Intervals

When severe or unusual environmental conditions exist or as flight requirements dictate, it is the responsibility of the operator to increase the frequency and scope of inspections necessary to ensure safe operation. Due to the operational nature of a "barrier" type filter, an important criteria for safe and successful operation is an unobstructed inlet/filter system. This can be accomplished by visual inspection of the filter prior to each flight. Where as small suspended particles on the outside of the filter element do not cause an appreciable airflow restriction, large, obvious debris such as leaves, brush, litter, etc., should be removed prior to flight. Good judgment and practice will ensure safe operation as well as long filter life.

Inspections, scheduled and conditional, shall be performed by qualified personnel and in accordance with standard aircraft practice. Compliance with all applicable Service Bulletins and Airworthiness Directives is mandatory.

Refer to Section 4.4 for post cleaning inspections.

Recommended Service Intervals

ITEM		PRE-FLIGHT	100 HOURS	300 HOURS	12 MONTHS (2)
a	Visual inspection of filter element (installed).	•			
b	Visual inspection of alternate air chamber for absence of debris.	•			
c	Inspect, clean, and re-oil filter element. (1)			•	•
d	Inspect and cycle alternate air doors.		•		•
e	Inspect differential pressure switch/ warning annunciator components.		•		•
f	Inspect electrical connectors.		•		•
g	Inspect attachment hardware, remove lower alternate air chamber housing and inspect complete actuator installation for security.			•	•
h	Inspect filter housing structure and associated hardware for cracks and general security.			•	•
i	Leak and pressure test differential pressure switch/annunciator system.				•

(1) *As required (failed inspection or "LOW INLET PRESSURE" annunciation), 300 hours, or 12 months,* ***whichever occurs first****.*

(2) *Hours of operation or 12 months,* ***whichever occurs first.***

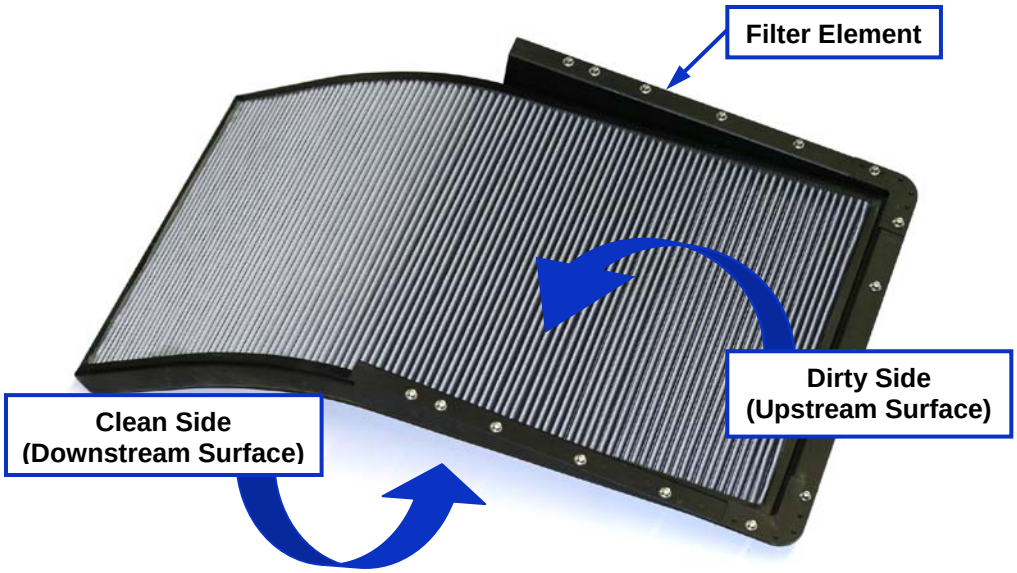
4.0 Filter Element Servicing

4.1 General

To ensure proper function and maintain a high level of filtration efficiency, great care should be taken when handling the Filter Element. The Element is more likely to be damaged during servicing than in operation. Special care should be taken when removing and reinstalling the element. The pleated material's wire mesh is easily damaged or deformed when allowed to scrape against other components. Careful attention to the following section will ensure full service from the filter element.

When operating in the most severe conditions it is highly recommended that an additional, serviceable and oiled element is available. This will allow continued service while the previously installed element is being cleaned, inspected and re-oiled.

Figure 1 – Filter Element



4.2 Removal and Reinstallation of Element

> **CAUTION:**
>
> Removal of Filter Element can introduce FOD to the intake plenum. Always inspect for FOD during Filter Element removal or reinstallation. Always cover engine inlet when Filter Element is removed to prevent FOD.

a) Loosen the ¼-turn fasteners (17X on Filter Element) securing the Filter Element, lift the element up and forward out of the Housing Assembly and remove. Take care not to allow Filter Element to contact cowl or other aircraft components during removal.

- Inspect ¼-turn fasteners on the element for security and damaged pins. If any damaged or missing pins are found, inspect inlet plenum and surrounding areas for FOD.

b) Reinstallation is reverse of above.

4.3 Filter Element Cleaning

4.3.1 Filter Element Cleaning – General

Remove Filter Element from the Housing Assembly. Hold the element clean side up and gently tap the element edges to dislodge any large embedded debris and dirt.

> **NOTE:**
>
> Use only FDC/aerofilter cleaner (P/N 40-15) to clean the filter element.

DO NOT use any other solvents or materials to clean filter element, no other substitutes are authorized.

DO NOT use Pressure or Steam Cleaners

DO NOT use High Pressure Hose Nozzles

> **CAUTION:**
>
> Failure to service the element correctly will harm the filter media by reducing its filtration efficiency, restricting airflow, and/or a reduction in service life.

4.3.2 Filter Element Cleaning – Severe Conditions

Severe Conditions are operating environments with high levels of contaminants (dust, sand, pollutants) which may result in higher amounts of filter debris than normal. In this case, the following additional cleaning steps may be required.

a) Soak each element dirty side down in a pan of FDC/aerofilter filter cleaner to a depth to allow complete coverage of filter element.

b) Allow cleaner to permeate for 20 to 60 minutes, depending on condition. Use caution to ensure that dirt is not transferred to the clean side of the element.

c) Remove element and shake thoroughly to remove dirty cleaner.

d) Resoak for five minutes in clean FDC/aerofilter filter cleaner.

4.3.3 Filter Element Cleaning – Normal Conditions

Normal Conditions are operating environments with lower to moderate levels of contaminants (dust, sand, pollutants) trapped in the filter media. Normal cleaning procedures may be used when the Filter Element contains less debris.

a) Lay element on a flat, clean surface, dirty side down.

b) Spray FDC/aerofilter filter cleaner liberally onto the entire element and allow cleaner to permeate for ten minutes. Do not use any powered device to spray the filter element.

c) Alternatively, soak element clean side up in a shallow pan of filter cleaner and allow cleaner to permeate for ten minutes.

4.3.4 Rinsing and Drying the Filter Elements

a) Rinse the elements with low pressure water from a garden hose. Always flush from the clean side to the dirty side to avoid driving particles further into the filter media.

b) After rinsing, gently shake off the excess water and set elements aside. Allow the elements to dry naturally. It is permissible to set the Filter Element in direct sunlight to aid drying.

DO NOT use Compressed Air
DO NOT use Open Flame
DO NOT use Hair Dryers or Heat Guns

CAUTION:
Excess heat will cause the filter media to shrink and high pressure air will open small holes that allow dirt to pass through.

c) Inspect element per **Filter Element Inspection – Normal Conditions** or **Filter Element Inspection – Severe Conditions** as appropriate before oiling.

4.3.5 Oiling the Filter Elements

> **NOTE:**
>
> The Filter Element must be **completely dry** before oiling. Oil will not be absorbed by Element media where excess moisture is present, and therefore will not achieve maximum protection it was designed to provide.

> **CAUTION:**
>
> Use only FDC/aerofilter Oil, P/N 40-10, no other substitute is authorized.

FDC/aerofilter Oil is a compounded mineral-based blend, formulated with special polymers to form the tack barrier. A blue dye has been added to show where the oil has been applied. Eventually the blue color will fade but the oil will remain.

> **CAUTION:**
>
> Never use the filter element without FDC/aerofilter Oil.

a) Fill sprayer with recommended quantity of FDC/aerofilter Oil: **12 fl. oz. (350 ml)** for entire Filter Element.

b) Charge sprayer with compressed air.

c) Apply oil to the Filter Element with smooth, complete passes parallel to pleats.

d) Continue to apply oil with smooth, complete passes 90 degrees to pleats.

e) Repeat **(c)** and **(d)** until all of the measured quantity of oil recommended in **(a)** is applied to the Filter Element.

f) Wait 30 minutes for proper wicking and lightly re-oil any light areas with additional oil if necessary.

NOTE:

Do **NOT** over-oil the element. Proper absorption is achieved when the filter media is completely wicked and any surplus oil has been allowed to drip from the element. This process may take 12 - 24 hours.

The filter element is now ready for installation.

4.4 Inspection Procedures

4.4.1 Visual / Preflight Inspection (Prior to first flight of the day)

a) Inspect Filter Elements for large obstructions and damage.

b) Inspect for security of all ¼-turn fasteners (17X on Filter Element).

c) Inspect Alternate Air plenum for absence of debris.

4.4.2 Filter Element Inspection – Severe Conditions

In these conditions, it may be necessary to clean and inspect the Filter Element more frequently than what is described in **Recommended Service Intervals**. An Element used in such conditions should be replaced if the Element media or fine mesh screen is severely degraded. Regardless of the actual time in service, the physical condition of the Element, when exposed to these harsh conditions, must remain the most important factor used to determine the serviceability of the Element.

4.4.3 Filter Element Inspection – Normal Conditions

At each cleaning carefully inspect the Filter Element as follows:

a) Inspect the fine mesh on the upstream & downstream surface of the element pleats. Complete erosion of more than .50” (12 mm) is cause for element rejection.

b) Inspect the coarse mesh on the downstream surface of the element. Any evidence of mesh wire wear or general signs of mesh breakage or deterioration are cause for element rejection.

c) Inspect the pleats containing the filter media. Excessive deformation of pleats can reduce smooth and consistent airflow into the engine and is cause for element rejection (see **Filter Element Pleat Deformation**).

d) After cleaning and before re-oiling, hold each element up to a light and check for holes in the element material greater than .030" (0.75 mm). It is normal to observe pinholes in the filter media particularly at the pleat folds. These pinholes will not allow the passage of dirt once the element is oiled. Close holes if present (see **Repairing Holes or Gaps in Filter Element Media**). Numerous holes in the media greater than .030" (0.75 mm) may be cause for element rejection (see **Holes or Gaps in Filter Element Media**).

e) Check the condition of the Filter Element and it's mating surface on the Housing Assembly:

- Element frame for chafing, cracks, fretting (smoking rivets), gouges and scratches.
    - o Chafing or surface finish damage may be repaired per AC 43.13.
    - o Cracks on the frame are causes for element rejection.
    - o Fretting (smoking rivets) or loose rivets are causes for element rejection.
    - o Gouges and scratches less than .005" may be repaired per AC 43.13. Consult FDC/aerofilter Technical Support for deeper gouges and scratches.
- Element media potting compound for chips, cracks, and/or de-bonding. Contact FDC/aerofilter Technical Support if any chips, cracks, and/or de-bonding of the potting compound are found.
- Seal strips in Housing Assembly for deterioration and evidence of gaps between mating surfaces. Seal strips must be replaced if any deterioration is found.
- ¼-turn fasteners for security and damaged pins.
- ¼-turn fastener receptacles on the Housing Assembly for security and loose rivets.

Defects found are to be rectified. Consult FDC/aerofilter Technical Support in the event any repair cannot be performed using standard practices.

NOTE:

The Filter Element shall be removed from service after 4500 hours of operation.

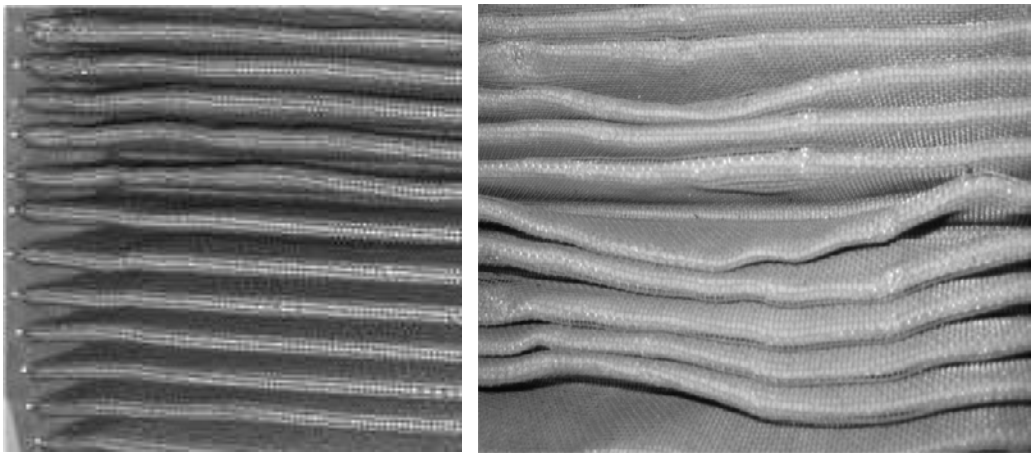
When operating in the most severe conditions it is highly recommended that an additional serviceable, pre-oiled element is available. This will allow continued service while the dirty element is being cleaned, inspected, and re-oiled.

4.4.4 Filter Element Pleat Deformation

The Filter Element pleat shape should be maintained as close to the original manufactured state as possible to ensure optimum airflow. As manufactured, an even spacing between crests of the pleats together with a clearly visible bend at the bottom of the inside pleat trough helps ensure optimum airflow.

Filter Element performance is not appreciably affected by a few warped pleats. However, it is advisable to repair warped pleats to prevent cumulative deformation. Use the examples in **Figure 2** to determine if Filter Element pleats are repairable. In general, if the bottoms of the inside troughs of the pleats cannot be seen when sighting the length of each pleat from above, or into the depth of the pleat, then straightening is needed. Refer to **Filter Element Pleat Straightening** for straightening procedure.

Figure 2 – Pleat Deformation

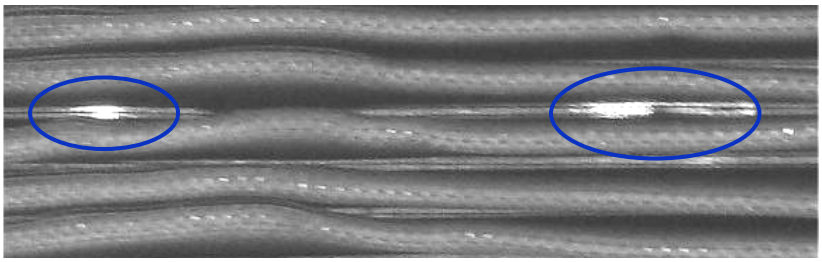


Repairable **Not Repairable, Element to be Rejected**

4.4.5 Holes or Gaps in Filter Element Media

Large gaps in Filter Element media may occur if the Filter Element has been subject to PROHIBITED actions such as the use of compressed air or pressure washers during servicing. Numerous holes in the media greater than .030" (0.75 mm) will reduce the filtration efficiency and may lead to engine performance degradation (Refer to **Figure 3**). Refer to **Repairing Holes or Gaps in Filter Element Media** for repair procedure.

Figure 3 – Non-Repairable Gaps, Element to be Rejected



4.5 Filter Element Servicing – Repair & Rework

4.5.1 General Information

While a Filter Element in general cannot be repaired or reworked, minor pleat deformation and small holes in media that can arise from aggressive handling, cleaning, or drying can be rectified. See **Filter Element Inspection – Normal Conditions** for inspection criteria. Take careful note of the following procedures to avoid damaging the Filter Element.

4.5.2 Filter Element Pleat Straightening

Filter Element should be cleaned and completely dry before straightening deformed pleats. Do not apply Filter Oil before straightening pleats. **Figure 4** shows examples of tools that may be used to straighten pleats. It is strongly recommended to place duct tape, electrical tape, or similar cushioning material on the jaws of the hand seamers or equivalent tools to prevent damage to Filter Element fine mesh when working the Element pleats.

Figure 4 – Klein Hand Seamer Tools

Klein 86552

Offset Hand Seamer

Klein 86553

Straight Hand Seamer

a) For pleats bowed or expanded: **GENTLY** crimp the pleat using a hand seamer or equivalent tool. Do not over-crimp, crease, or crush the pleat in the jaws of the seamer. Maintain the original radius at the crest and bottom trough of the pleat as much as possible when crimping.

b) For pleats to be straightened: **GENTLY** grip the pleat with the hand seamer and rotate the seamer to restore the pleat to its correct position. Multiple adjustments may be required for each few inches of the pleat until the final result is straight.

c) When working with the pleats, do not push the hand seamer into the pleats to their maximum depth – ensure the radius at the bottom of each pleat remains when finished.

4.5.3 Repairing Holes or Gaps in Filter Element Media

In normal practice, small pinholes will occur in Filter Elements, particularly at the pleat folds. These pinholes will not allow dirt through the Element once oiled. Holes less than .030" (0.75mm) can be closed as follows:

a) Insert the end of a clean, fine pick into the epoxy-coated mesh, penetrating the filter media. **GENTLY** reposition the filter media a small amount at a time to close the hole. Manipulate the pick carefully to avoid damaging the fine mesh covering the media.

b) Repeat **(a)** from each direction around the hole to avoid creating new holes.

4.6 Test and Functional Check Procedures

4.6.1 Differential Pressure Testing Equipment

For certain tests and checks of the Differential Pressure Switch, it is helpful to have the following:

- A manometer, either U-tube or digital (preferred Example: Dwyer 47x series),
- Tygon or similar tubing,
- A low-pressure vacuum source:
  - o Small volume syringe (0.5 cc – 1.0 cc),
  - o Brake bleeder with reservoir,
  - o Deadweight tester.

Note that the vacuum to be pulled to test the DPS is very small – *less than 1.0 PSI total range*. If no compatible reservoir is available for the tools above, a sufficient length of tubing (6 – 9 ft. / 2 – 3m) may be used as a reservoir. Choose the tool that gives the most control over the amount of vacuum to be pulled, and ensure that the total vacuum is no greater than 25 in-H_2O.

4.6.2 Functional Check of Differential Pressure Switch / Annunciator System

CAUTION:
Do not apply over 25 in-H_2O ΔP to the Differential Pressure Switch (DPS) or apply any pressure to the ambient port.
Damage to DPS could result.

a) Energize aircraft power.

b) Gain access to transmission bay.

c) Disconnect the Low Pressure Tube from the Differential Pressure Switch (DPS) low pressure port (marked "VAC" on DPS).

d) Attach flexible tubing to the DPS low pressure port (refer to **Figure 5**).

e) Connect the other end of the hose to a manometer and a low pressure vacuum source. If a syringe or brake bleeder is used as a low pressure vacuum source, ensure a vacuum reservoir is used between the syringe and the DPS / manometer.

f) Carefully apply LIGHT suction to the DPS while noting manometer readings. At 9.0 ±1.0 in-H_2O, the "LOW INLET PRESSURE" annunciator should illuminate.

g) Remove suction from DPS – "LOW INLET PRESSURE" annunciation should extinguish.

h) Remove test equipment and reattach the Low Pressure Tube or Hose to the DPS port marked "VAC".

i) De-energize aircraft power.

NOTE:
Contact FDC/aerofilter Technical Support if the system is out of adjustment

Figure 5 – Manometer Test Setup