CATERPILLAR®

Special Instruction
Caterpillar Certified Procedure to Inspect and Clean Air Filters{1051, 1054}
Media Number -SEBF8062-06 **Publication Date -18/11/2014** **Date Updated -19/11/2014**

i05981966

Caterpillar Certified Procedure to Inspect and Clean Air Filters{1051, 1054}

SMCS - 1051; 1054

Caterpillar Products:Commercial Engines 3500B and 3500C
Caterpillar Products:Machine Engines with Electronic Unit Injectors 3500 Series
Caterpillar Products:Machine Engines with Mechanical Unit Injectors 3500 Series
Caterpillar Products:Machine Engines 3500B Series All 3500 Series
Caterpillar Products: Engines with ACERT Technology
Engine: Commercial with Mechanical Unit Injection 3126
Engine: Machine with Mechanical Unit Injection 3126
Engine: Truck with Mechanical Unit Injection 3116
Engine:14.6 L 3406
Engine: 3114 3116 3126 3126 and 3126B 3126B 3408 3412
Engine:Commercial with Electronic Unit Injection (EUI) 3500
Engine:Commercial with Mechanical Unit Injection (MUI) 3500
Engine:Commercial with Mechanical Unit Injection 3114 3116
Engine:Commercial 3406B 3406C 3500 and 3500B 3500 and 3500B Engines with Standard Displacement 3500B and 3500C High Displacement All Diesel G3500 Family
Engine:Generator Set 3500 Series
Engine:Industrial, Marine, and Generator Set that Use Flash Programming All
Engine:Machine with Mechanical Unit Injection 3114 3116 3500 Series
Engine:Machine 3066 3114 3126 3500B Series All 3412
Engine:Marine 3500 Series
Engine:Truck with Hydraulic Electronic Unit Injection (HEUI) 3116 3126 3126B
Engine:Truck with Mechanical Unit Injection 3114
Engine:Truck 3406B 3406C Electronically Controlled
Engine:Trucks that Use Flash Programming All
Engine:with Jake Brake Retarders Built Prior to 1999 All
Engine: 3114 Truck Engines 3116 Truck Engines 3126 Truck Engine 3126B Truck Engine 3126E Truck Engines 3208 Truck Engines 3408E and 3412E All 3600 All G3600 All Gas Engines C7 On-Highway C9 On-Highway Equipped with Air Compressors
Industrial Engine:with Turbochargers All
Industrial Engine: 3003 3013 3014 3024 3114 3116 3126 3126B 3176 3204 3208 3304 Diesel 3306 Diesel 3406 Diesel 3406C 3408 3408 Diesel 3412 C-10 C-12 C-15 C-16 C-9

Machine Engines: 3408E 3412E
Machine Engines:with Mechanical Unit Injection 3500 Series
Machine Engines: 3003 3013 3014 3024 3046 3054 3054B 3054C 3054E 3056 3056 and 3064 3056E 3066 3114 3116 3126 3126B 3176 3176C 3196 3204 3208 3304 3306 3406 3406B 3406C 3406E 3408 3412 3456 3508 3512 3516 All C-12 C-15 C-16 C-9
Marine Engine:with Turbochargers All
Marine Engine: 3116 3126 3126B 3208 3304 3306 3406 3408 3412 C-12 C-9
Truck Engines:Truck All
Truck Engines: 3176 3406E C-10 C-12 C-15 C-16

Introduction

NOTICE

Caterpillar® no longer recommends cleaning primary air filters when the service life has been met. If a new air filter is not available for installation, follow the procedure below until a new filter can be installed. Reuse of primary air filters will cause the warranty of the filter to be voided. Do not use any cleaning method other than the one specified in this guideline.

Note: Caterpillar recommends using air in low pressure and high volume to clean air filters.

The following information is found in this guideline.

- Reusability of filters
- Cleaning indicators
- Inspection and cleaning methods
- Correct packaging and storage

Call (309) 636-8500 for additional information on your filter.

PowerCore is a registered trademark of Donaldson Company Inc.

WARNING

Do not wash air cleaner elements in any flammable solution such as diesel fuel or gasoline. Doing so can cause fire or an engine runaway and can result in personal injury.

Tooling and Equipment

Contact the Caterpillar Service Technology Group for questions regarding tooling and equipment.

Caterpillar Service Technology Group
501 S.W. Jefferson Avenue
Peoria, Illinois 61630

1-800-542-8665 (USA)

1-800-541-8665 (Illinois)

1-800-523-8665 (Canada)

1-309-675-6618 (Fax)

Types of Air Filter Elements

Air Filters Which Can Be Cleaned

Illustrations 1, 2, 3, and 4 show the primary elements of the air filters that can be cleaned until a new filter is installed. These filters have a folded paper design which can withstand cleaning.

Note: Air filters with axial seals and radial seals can be cleaned.

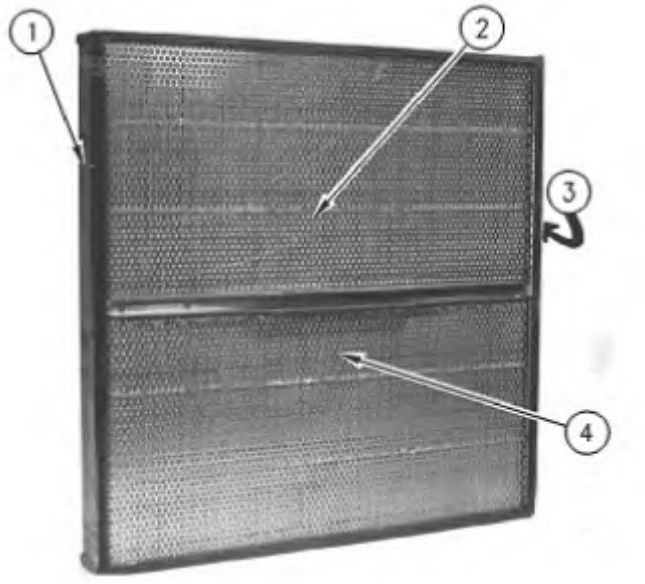

Illustration 1 g01158809

Nomenclature of panel type air filters which can be cleaned.

(1) Gasket

(2) Metal screen

(3) Dirty side

(4) Clean side

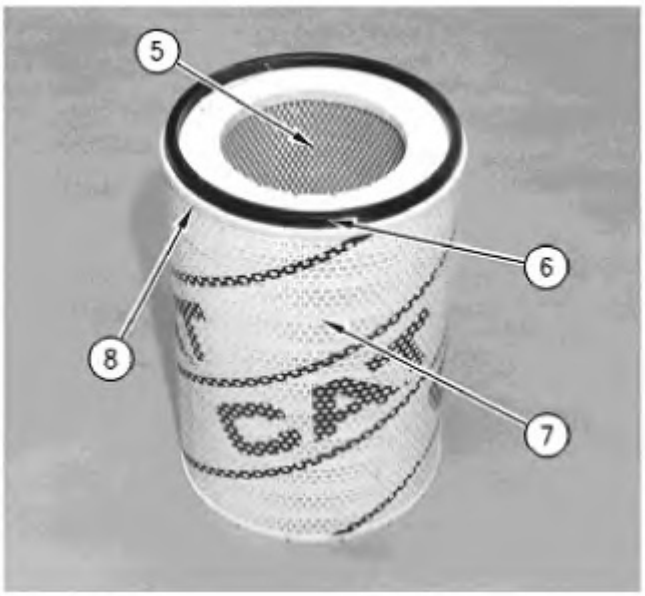

Illustration 2 g01158816

A typical example of an air filter element with an axial seal which can be cleaned.

(5) Clean side

(6) Axial seal

(7) Metal screen

(8) End cap

Illustration 3 g01158817

A typical example of an air filter element with a radial seal.

Illustration 4 g01158818

An example of a PowerCore air filter element with a radial seal.

Air Filters Which Cannot Be Cleaned

There are some types of air filters that cannot be cleaned, such as secondary air filters. The following air filters cannot be cleaned and should be replaced:

- Secondary air filters
- Filters with damage to the filter paper
- Rebuilt air filters
- Standby filters for engines
- Air filters for fire pumps

Illustration 5 g01158824

Secondary air filters cannot be washed.

Air Filter Restriction Indicator

Note: The air filter indicators need annual replacement.

Use an air filter restriction indicator (Illustrations 6 and 7) to determine when a filter should be replaced. The two types of restriction indicators are the flag type and the graduated type.

Illustration 6 g01158832

These graduated restriction indicators are found on newer engines.

Illustration 7 g01158835

A flag type air filter restriction indicator (older style).

Inspect the indicators daily for cracks, holes, or loose fittings. If the indicator is damaged, the indicator must be repaired or replaced when any of these conditions are present.

See the appropriate Operation and Maintenance Manual for further information.

Inspection

Visually inspect the filter for damage and failures in the filter seal, gasket, and outer cover before cleaning the filters. Do not use any failed filters or any damaged filters. PowerCore air filters require inspection of the beads of glue for damage and inspection of the filter paper for damage.

Illustration 8 g01158840

Typical damage to an axial air filter element

Do not use this air filter again.

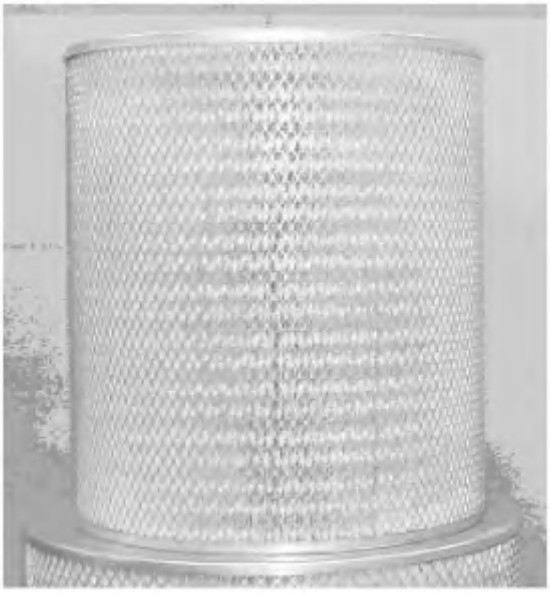

Illustration 9 g01158864

Typical example of a reusable axial air filter element

Reuse this air filter until a replacement can be installed.

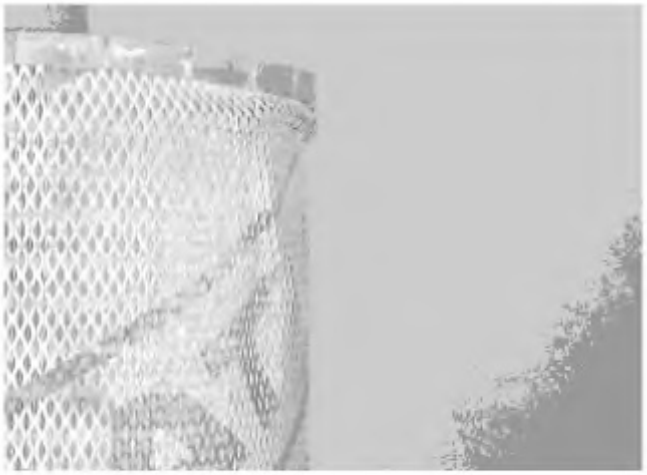

Illustration 10 g01158870

Typical damage to an air filter element with a radial seal.

Do not use this air filter again.

Illustration 11 g01158874

This gasket will give a good seal.

Reuse this air filter until a replacement can be installed.

Illustration 12 g01158877

This gasket is badly damaged.

Do not use this air filter again.

Illustration 13 g01158878

A typical example of a reusable gasket for an air filter with an axial seal.

Reuse this air filter until a replacement can be installed.

Illustration 14 g01158879

This gasket is badly damaged.

Do not use this air filter again.

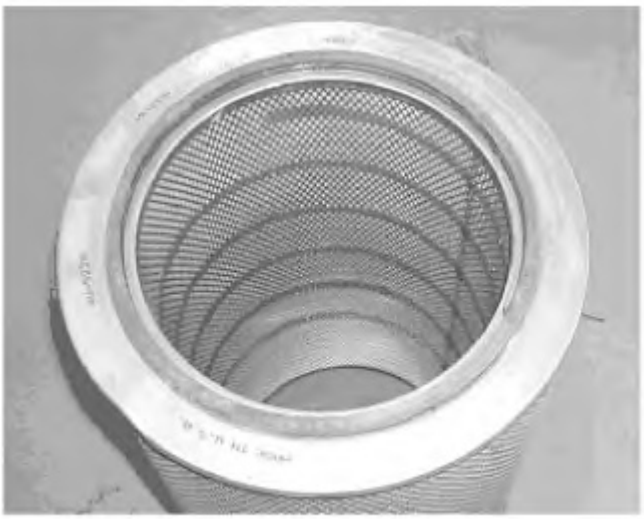

Illustration 15 g01158880

A typical example of a reusable air filter element with an axial seal.

Reuse this air filter until a replacement can be installed.

Illustration 16 g01158882

A typical example of a reusable air filter element with a radial seal.

Reuse this air filter until a replacement can be installed.

Illustration 17 g01158884

A typical example of a reusable air filter element with a radial seal.

Reuse this air filter until a replacement can be installed.

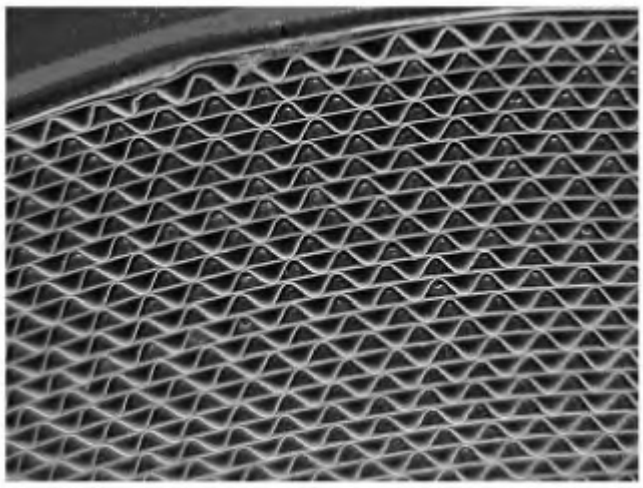

Illustration 18 g01158885

A typical example of the beads of glue that are on a reusable PowerCore air filter with a radial seal.

Reuse this air filter until a replacement can be installed.

Recycle Center Layouts

Note: All Measurements are in meters.

Illustrations 19 through 21 show the three types of layouts for recycling centers that are recommended by Caterpillar.

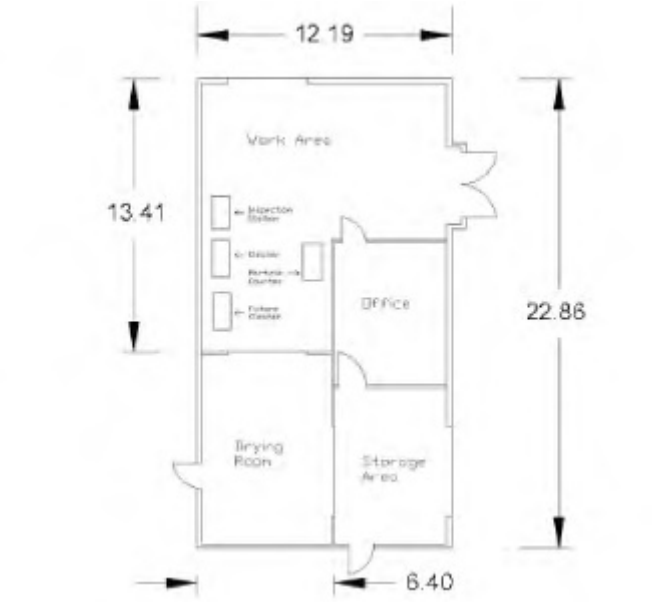

Illustration 19 g01158886

This layout is used.

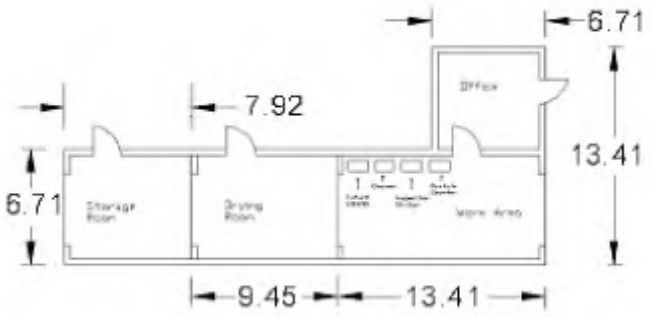

Illustration 20 g01158889

This layout is used.

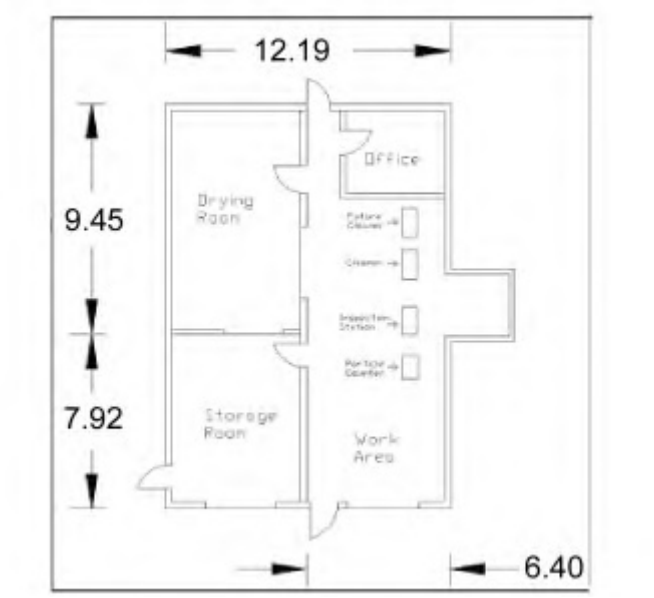

Illustration 21 g01158893

This layout is used.

Table 1

Conversion Chart
Meters (Feet)
6.40 m (21.0 ft)
6.71 m (22.0 ft)
7.92 m (26.0 ft)
9.45 m (31.0 ft)
12.19 m (40.0 ft)
13.41 m (44.0 ft)
22.86 m (75.0 ft)

Table 1

A conversion table for converting meters into feet.

Cleaning Using Low Pressure and High Volume of Air

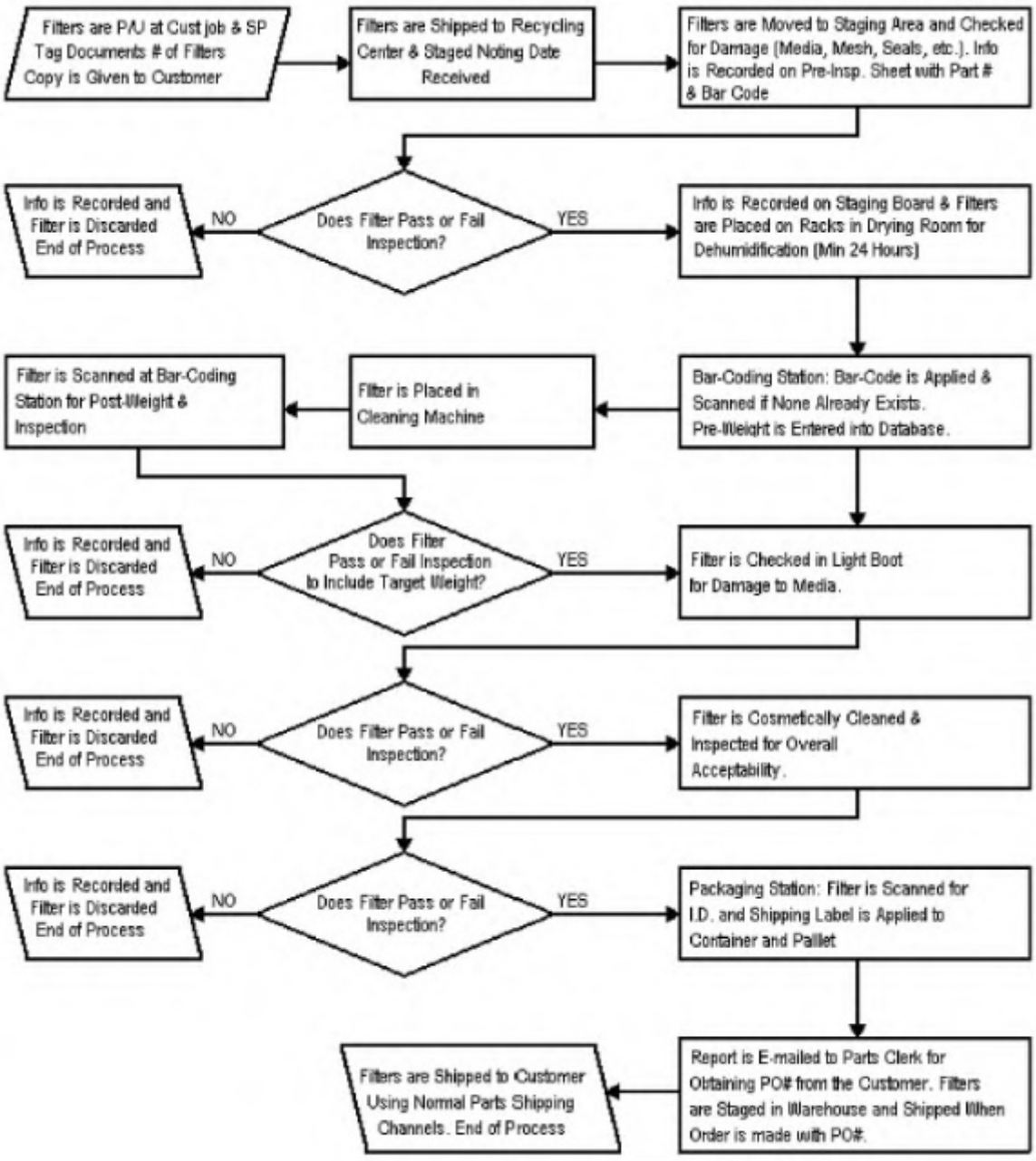

Illustration 22 g01158910

A flow chart for the process of cleaning air filters.

Filter Preparation

Illustration 23 g01158895

A typical example of a storage location with a machine for crushing cardboard containers and a machine that cleans seals.

Note: Make sure that you wear the correct protection for your eyes, ears, hands, and lungs.

Note: Make sure that all of the customer air filter elements are cleaned together. This process will ensure that each customer will receive the original air filter elements.

(1) The air filter elements are delivered to an area in order to be prepared for cleaning. Remove the air filters from the pallets. Visually inspect the air filter elements for damage to the media, damage to the mesh, and damage to the seals. Discard damaged air filter elements.

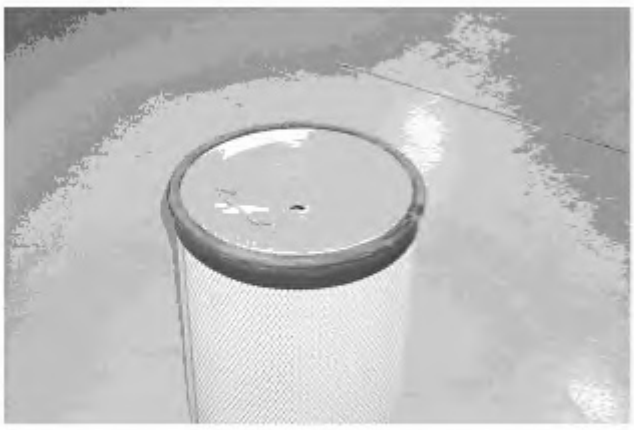

Illustration 24 g01158901

A typical example of a seal for an air filter.

Note: Not all air filters are equipped with top seals.

(2) If necessary, remove the seal from the air filter.

Illustration 25 g01158902

An example of a rack for cleaning the seals.

Illustration 26 g01158903

An example of a machine that cleans parts.

(3) Fill the rack with seals. Wash the seals with a machine that washes seals with a biodegradable chemical detergent.

Illustration 27 g01158904

An example of tags with bar codes.

Illustration 28 g01158905

An example of a bar code that is positioned on an air filter element.

Illustration 29 g01158911

An example of recording an air filter element with the system that uses the certified bar codes.

Note: If the part number is not in the database, the part number must be recorded.

Note: The air filter is located in the process by using the bar codes.

Note: Check the air filter elements for previous bar codes. If a tag with a bar code is not found, place one on the air filter element.

(4) Install the tag with the bar code to the air filter element. Scan the bar code by using the database of bar codes. Record the part number, the customer number, the customer location, and the industry code. Each industry code is found below.

Industry Classification Codes

A - Agriculture

110 - Crop Production

123 - Land forming, Drainage, and Irrigation

132 - Dairy Farm

B - Building Construction

155 - Landscaping

240 - Residential Building

250 - Commercial and Public

270 - Sewer and Water

C - Heavy Construction

200 - Highways and Streets

201 - Highways, four or more lanes

209 - Dams, Levees, and Canals

220 - Airports

850 - Military

E - Rental

710 - Rental Independent

740 - Caterpillar Rental and Dealer

F - Forestry

405 - Timber Harvesting and Logging

410 - Access Road Construction and Maintenance

440 - Mill and Yard Operations

450 - General Forestry

I - Industrial

255 - Demolition

312 - Petroleum, Chemical, Rubber Products

313 - Metal Products

314 - Asphalt, Cement, Concrete

321 - Scrap Handling

322 - Recycling

331 - Utility Companies

M - Mining

510 - Coal Surface

511 - Coal and Underground

512 - Coal Surface and Coal Underground

520 - Metal Mining

557 - Quarry, Stone, Sand, and Gravel

570 - Nonmetals not classified

W - Waste

920 - Landfill Operation

Illustration 30 g01158914

A typical rack for air filters.

Illustration 31 g01158915

An example of the air filter elements as the elements are located in the process of cleaning.

Illustration 32 g01158917

Typical example of a room for drying

Note: Designate a shelf on a rack for each customer air filters in order to prevent confusion.

(5) Load the air filter elements onto racks. Position the racks of filters in a room in order to dry the filters for 24 hours at a temperature of 41 °C (105 °F) to 43 °C (110 °F). Label the staging boards on the racks by the customer name, the received date or the inspected date, and the number of air filters.

Illustration 33 g01158918

Typical example of weighing an air filter element

Note: Caterpillar recommends using only the cleaning procedure that uses air at low pressure and high volume.

(6) Remove the filter racks from the room. Position a used air filter element on the digital scale.

(7) Scan the bar code by using the wand. Enter the weight into the database.

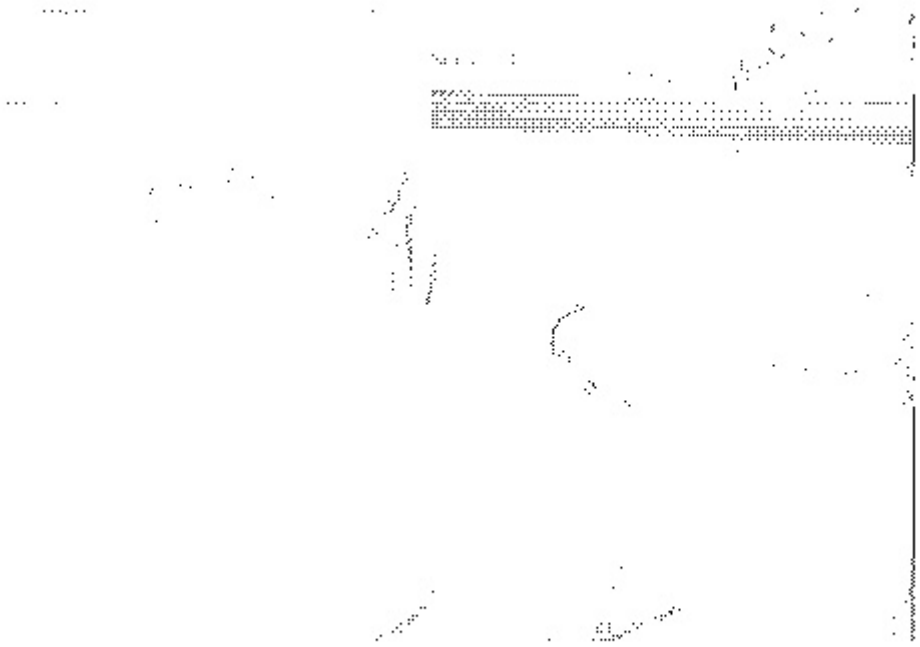

Illustration 34 g01158919

An example of recording the air filter element by using the bar codes.

Note: Weights of air filter elements are established by entering the weights of the air filter element into the database.

Filter Cleaning

Illustration 35 g01158920

Loosen the dirt in the filter paper.

(1) Position the air filter element according to Illustration 35. By using a wide soft faced hammer, lightly tap on the air filter screen. Continue tapping lightly until most of the particles are loose.

Illustration 36 g01158923

A Caterpillar Service Technology Group machine for cleaning air filters.

Note: Some brands and some types of filters need to be cleaned for different lengths of time. Caterpillar air filters should be cleaned for 4 minutes. Contact the manufacturer of the air filter for specifications.

Note: Some elements of the air filter may need to be cleaned again.

Note: The particles are removed with Caterpillar's by using air at high volume and low-pressure air.

(2) The air filter element is positioned according to Illustration 36 in the machine. Set the machine to the appropriate height of the air filter element. Close the door, and clean the air filter element for 4 minutes. Clean the air filter element again, if necessary

Note: You may notice a wavy appearance in the filter paper when you clean the air filter element. The wavy appearance is acceptable.

Illustration 37 g01158948

A typical example of a radial air filter with wavy filter paper.

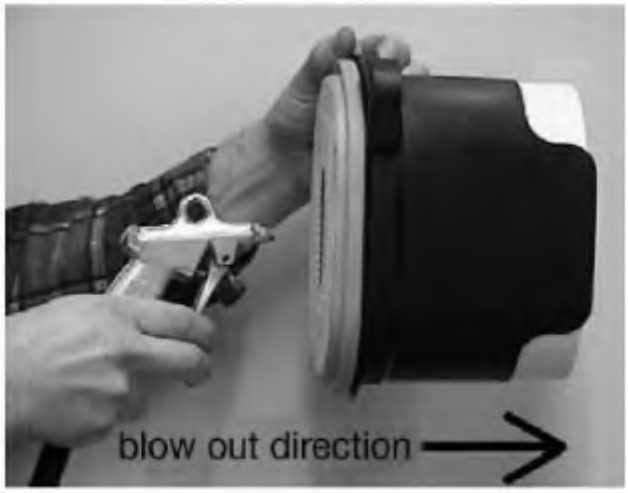

Illustration 38 g01158950

Typical example of cleaning a PowerCore air filter with pressurized air

Use pressurized air (less than 620 kPa (90 psi)) to remove dirt from the filter. The air nozzle must be no less than 5.08 cm (2 inches) from the end of the air filter that exits the air.

Final Inspection

Illustration 39 g01158954

Weighing a cleaned air filter element

Note: Weigh three new air filter elements with the same part number. Take the average of the three air filter elements. This measurement is your standard weight for a new air filter element.

(1) The air filter element is returned to the system that uses bar codes for a second weighing. Position the cleaned air filter element on the digital scale. Weigh the cleaned air filter element. If the cleaned air filter element is within 0.27 ± 0.18 kg (0.6 ± 0.4 lb) of the standard weight for the new air filter element, the air filter element passes. If the actual weight of the cleaned air filter element exceeds 0.27 ± 0.18 kg (0.6 ± 0.4 lb), the air filter element fails. The following chart shows when an air filter element passes or an air filter element fails.

Note: Discard all failed air filter elements.

Note: The target weight is calculated by adding 0.27 ± 0.18 kg (0.6 ± 0.4 lb) to the standard weight.

Table 2

Part Number	Standard Weight (lb)	Target Weight (lb)	Actual Weight (lb)	Status
106-3969	9.6	10.2	9.8	pass
4W-5228	16	16.6	17.1	fail
7W-5317	4.8	5.4	4.7	pass
9Y-7662	22.2	22.8	30.3	fail
6I-2499	3.4	4.0	4.0	pass
7Y-1323	7.8	8.4	8.9	fail

This table shows when an air filter element passes or an air filter element fails.

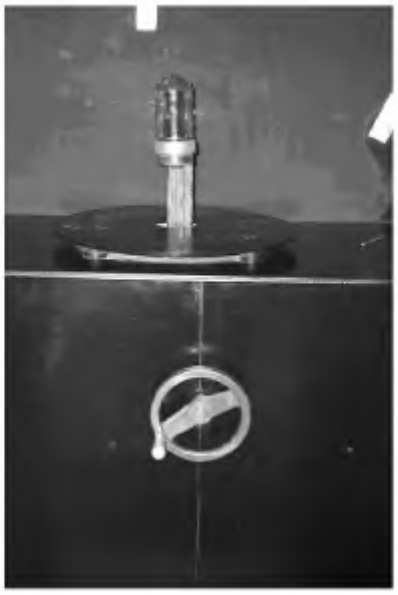

Illustration 40 g01158959

An example of a box with a light.

Illustration 41 g01158960

An example of inspecting an air filter element by using a box with a light.

Note: Caterpillar recommends using a 500 to 1000 W clear light bulb.

(2) Place the air filter element into the box in order to inspect the filter paper. Turn on the clear light bulb in order to inspect the air filter element.

Note: Finding the small holes and small tears can be difficult.

(3) Slowly spin the air filter element and move the bulb up and down. Replace an air filter element with thin filter paper or tears.

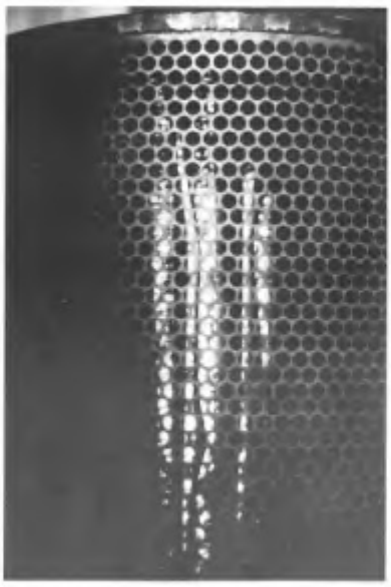

Illustration 42 g01158962

Typical damage to the element of a radial seal air filter

Do not use this air filter again.

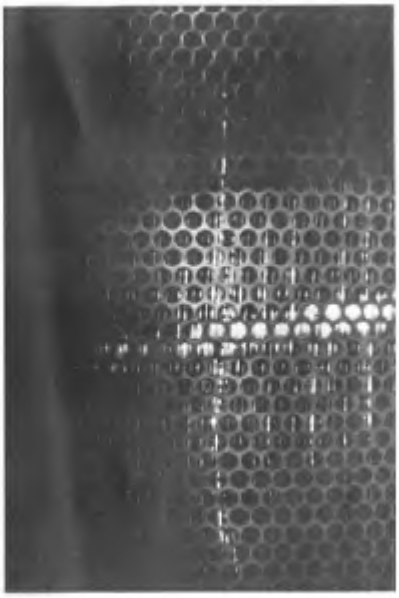

Illustration 43 g01158963

A typical example of a reusable element of an air filter with an axial seal.

Reuse this air filter until a replacement can be installed.

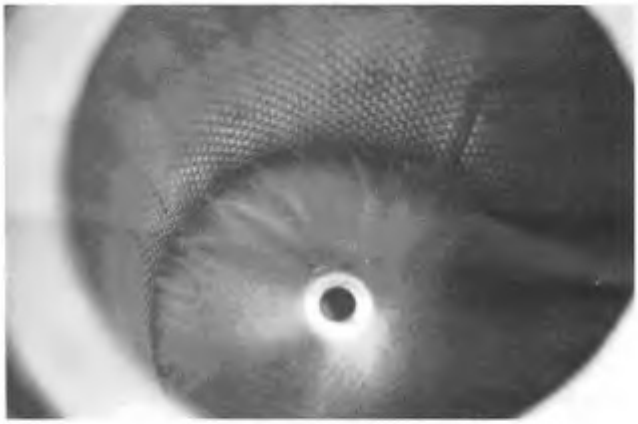

Illustration 44 g01158964

A typical example of dust on the end of the clean side of the air filter element.

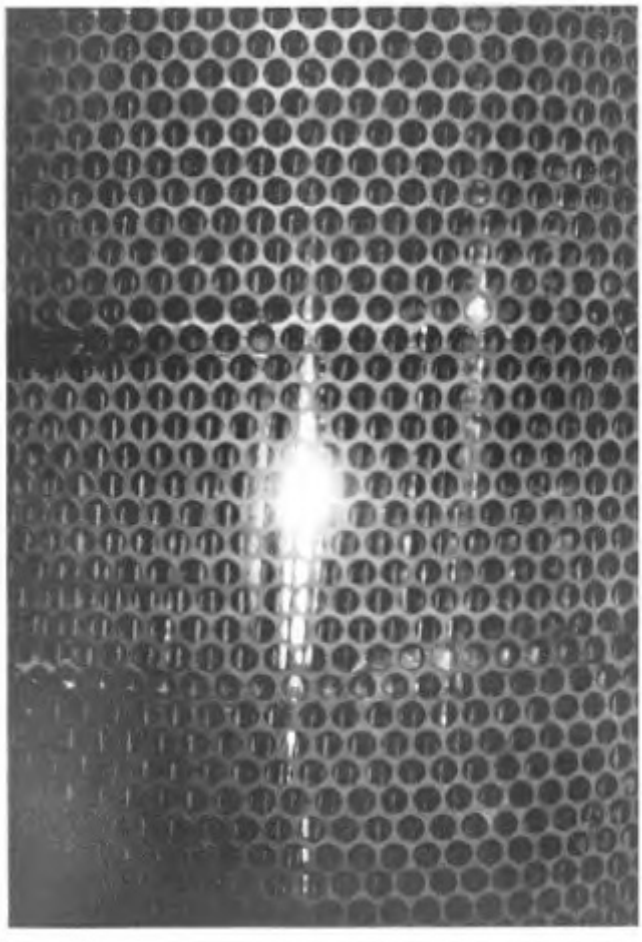

Illustration 45 g01158965

An example of a hole in the air filter paper.

Do not use this air filter again.

(4) If the air filter element fails, enter the information into the certified system by using the bar code.

Illustration 46 g01158967

Putting a bar code on the air filter element

(5) Use the certified system by using the bar code to identify the air filter element.

Illustration 47 g01158970

Cleaning the air filter element with a mild cleaner

Note: Apply **138-8448** Plastic Protectant to all seals and surfaces of axial air filter elements and radial air filter elements.

Note: Do not allow the filter paper to get wet.

(6) Position the air filter element into the fixture. Visually inspect the air filter element for final acceptability. Use a rag with **138-8448** Plastic Protectant to clean the air filter element. Apply **138 -8448** Plastic Protectant to all the sealing surfaces.

Note: Write the reason that the air filter element failed in your records and the customer records.

(7) Use the system of bar codes to record if the air filter element passed or if the element failed.

Illustration 48 g01158971

The label that is used to identify each air filter element that has been packaged

Note: Make sure that the correct labels for identification are placed with the corresponding air filter elements.

(8) If the air filter element passes final inspection, then print the label that identifies the air filter element.

Packaging and Storing Air Filter Elements

Note: If the air filter element passes final inspection, but the element will not be reinstalled immediately then mark the element. Marking the filters allows for the filter to be put into storage. Indicate the date of cleaning, and the name of the customer.

Illustration 49 g01158972

An air filter element that is being wrapped.

Note: The plastic bag is used to prevent the air filter element from being contaminated.

(1) Position the air filter element into a plastic bag. Tape the plastic bag together at the seal end of the air filter element.

Illustration 50 g01158973

Packaging an air filter element

(2) Place the air filter element into a box. Tape the box tightly.

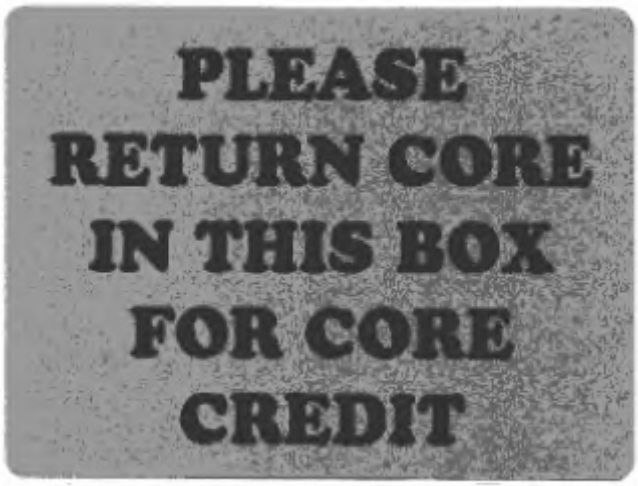

Illustration 51 g01158975

Typical example of a return label for a core

Illustration 52 g01158977

Typical label for identifying an air filter element

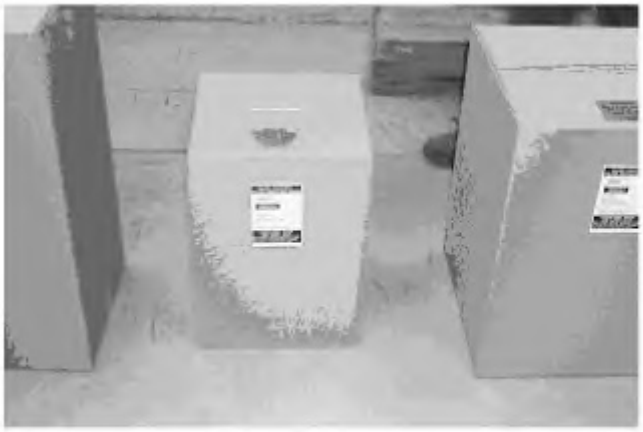

Illustration 53 g01158978

An element of an air filter that is packaged.

Note: Make sure that the label for identifying the element matches the air filter element.

(3) Install the identification and return labels on the container.

Illustration 54 g01158979

A pallet after being wrapped.

Illustration 55 g01158980

Typical example of a label for a pallet

Note: Make sure that each customer air filter elements are shipped together.

(4) The air filter elements should be placed on a pallet after the filter elements are packaged. Wrap the pallet and place the pallet label on the pallet.