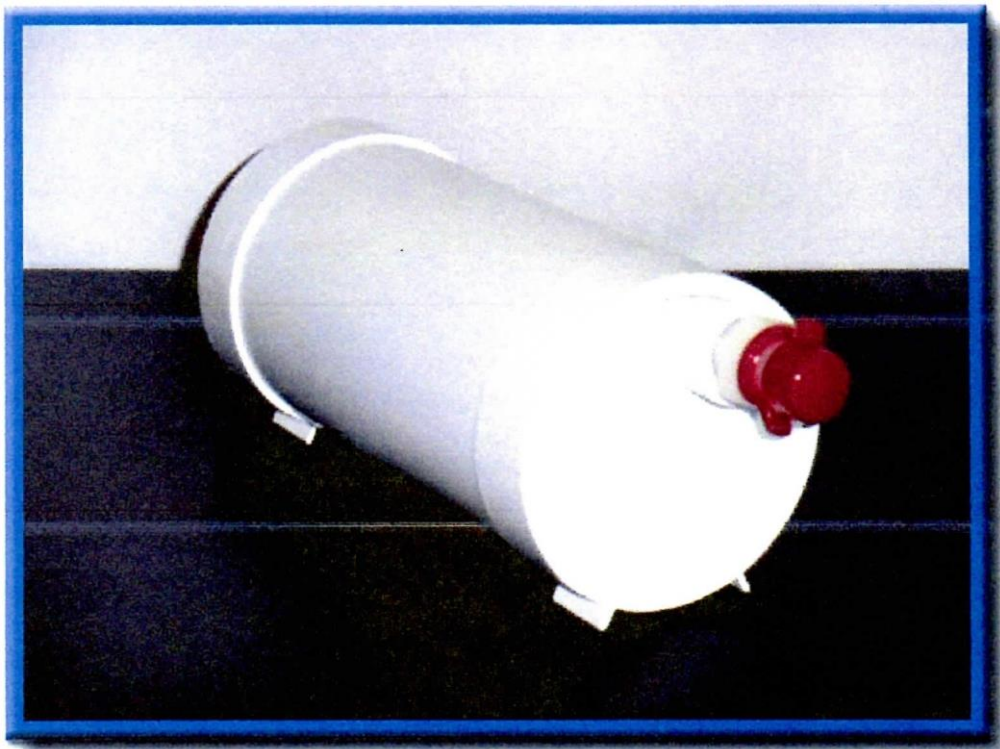


DD2011 Chairside Amalgam Separator



Instruction Manual Version 4.3

(FEBRUARY 2015)

Product Description

The DD2011 disposable chair side amalgam separation system has been tested and passed the ISO 11143 protocol [ISO 11143:2008(E)]. The DD2011 is designated as a Type 3 amalgam separator (filter system). The maximum water flow rate is 1.0 liters per minute. **The maximum fillable volume of the separator is calculated to be 360 ml.** The separator is installed in the dental vacuum line (HVE line). The DD2011 needs to be changed when the air flow at the HVE tip is no longer adequate, which can be determined with the use of an integrated digital vacuum gauge alarm system. The change out rate varies from 1 to 6 months and depends upon chair activity. The DD2011 is designed to handle a standard dental vacuum of 7 inches of Hg. Instructions for changing of the filter are found at the end of the manual.

Installation

Installation of the chair side amalgam separator varies as a function of dental chair design. Photographs of typical installations are shown below and may be a useful guide. The separator is placed under the dental chair and spliced in line with the high volume evacuation lines. The unit ships with 1/2, 5/8, and 1 inch nylon hose barb fittings.

The separator has two NPT ports, one is the "inlet" port and is located "off axis". The second port is the discharge and is located in the center axis of the separator. It is important to have the "inlet" port connected to the HVE tip (i.e. coming from the patient) and the "outlet" port connected to the vacuum source (dental vacuum pump).

In many dental chairs, the vacuum hose is "snaked" inside the chair and subject to sharp bends which limit the air flow through the hose. A short direct connection from the floor to the separator improves air flow and prevents debris

from occluding the lines.

It is recommended that the chair side trap remain in use. The trap prevents large pieces of debris from clogging hoses.

The Department of Defense Medical Military Facilities Design and Construction Criteria (Military Handbook-1191) calls for the following dental vacuum system operating criteria to be met:

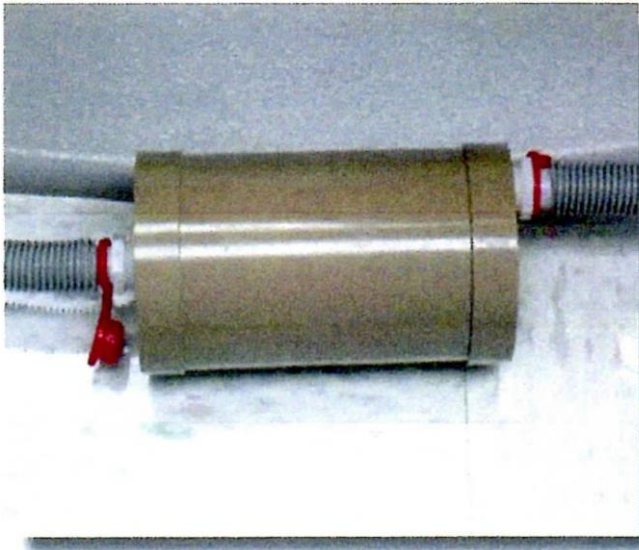
21 to 27 k:Pa (6 to 8 in-Hg) with a minimum vacuum of 21 k:Pa (6 in-Hg) to be maintained at the farthest HVE inlet

t A flow rate of 3.3 liters/second (7 standard cubic feet per minute).

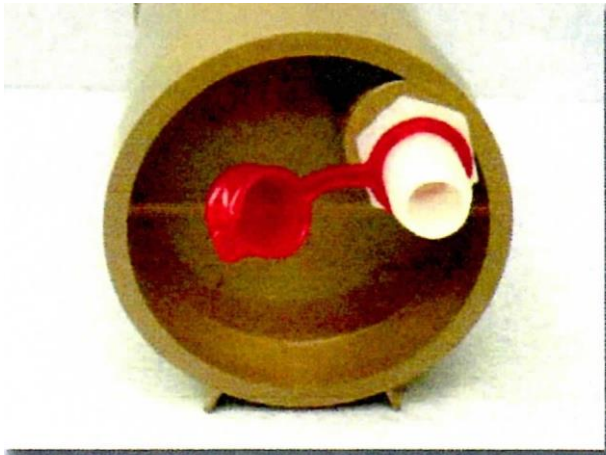
Amalgam Waste Recycling Issues

Although mercury in the form of dental amalgam is very stable, amalgam should **not** be disposed of in the garbage, infectious waste "red bag," or sharps container. Mercury containing amalgam waste generated in the dental operator can on occasion meet the requirement of a hazardous waste. Amalgam should **not** be rinsed down the drain. Some communities incinerate municipal garbage, medical waste, and sludge from wastewater treatment plants. If amalgam waste ends up being incinerated mercury vapor can be released to the environment due to the high temperatures used in the incineration process. Increasingly, local communities are enacting restrictions on the incineration of wastes containing mercury.

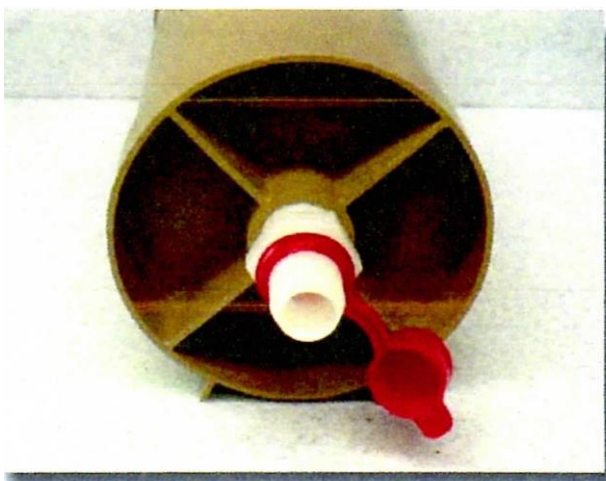
Contact your local environmental specialist prior to disposal of any mercury containing hazardous waste.



The DD2011 amalgam separator shown installed on a Dental chair. The unit is placed on the floor next to the chair. It can be located inside the floor mounted junction box if space permits. The unit shown here is placed to the side of the chair but can be move to any location that is convenient. The unit shown here has the 5/8 inch nylon hose barb fittings with the red vinyl caps. For some installations, the HVE hose may have to be relocated outside the chair. Velcro® fasteners can be used to mount the unit to the dental chair, keeping the unit off the floor.



The photograph at the left shows the inflow side of the DD2011. Note that the inflow port is "off axis". This side of the separator is connected to the HVE line coming from the patient Note the red vinyl cover over the 5/8 inch inflow port of the separator. When the separator is loaded with debris and needs changing, the red vinyl cover is placed over the port to prevent any leakage of debris from the separator.



The photograph at the left shows the outflow side of the DD2011. Note that the outflow port is in line with the Jong axis of the separator. This side of the separator is connected to the vacuum source. Note the red vinyl cover over the 5/8 inch outflow port of the separator. When the separator is loaded with debris and needs changing, the red vinyl cover is placed over the port to prevent any leakage of debris from the separator.

Recycling Program

The American Dental Association Best Management Practices (BMPs) recommends that all amalgam waste be recycled.

Vacuum Line Cleaner Effects on Hg Levels in Dental Wastewater

Vacuum line cleaners are recommended by some manufacturers of dental vacuum systems to help keep the lines from clogging and to limit the formation of odors. The chemical makeup of line cleaners can have important effects on dissolved Hg levels in dental wastewater. Oxidizing line cleaners, especially chlorine containing products like sodium hypochlorite (bleach) can mobilize or dissolve Hg contained in amalgam particles found in vacuum lines. Oxidizing vacuum line cleaners should be avoided.

Vacuum Line Cleaners and Foam Production

Many different issues can affect the performance and endurance of dry dental vacuum systems. The use of vacuum line cleaners can have a profound effect on both dry vacuum pumps and on DD2011 amalgam separator. Foam producing line cleaners produce plaque-like deposits in vacuum lines and more significantly have been shown to damage dental vacuum pumps. Foam enters the dry vacuum pumps and over time cause the buildup of deposits that causes them to fail prematurely. Foam also causes the DD2011 amalgam separator to clog prematurely. For these reasons, the use of line cleaners that foam is not recommended. We recommend the use of Pure Vac (Sultan Chemists, Englewood, N.J.) as it does not mobilize Hg (to a significant extent) and does not foam to the point where it will damage vacuum pumps.

Air Flow Levels (Vacuum Quality) in Dental Units

The ability of the High Volume Evacuator (HVE) to remove water and debris from the dental patient's mouth is an important issue. Adequate suction levels are needed to safely remove water and

debris from the patient's oral cavity. HVE performance is best measured at the HVE tip utilizing a digital vacuum gauge. A critical factor in HVE vacuum level is the diameter and geometry of the vacuum lines that run through the dental chair. Small diameter lines running a tortuous course can limit air flow and cause inadequate vacuum. Right angle (90 degree) vacuum line fittings and "pinched" vacuum lines can substantially reduce air flow leading to inadequate HVE performance. For this reason, it is recommended that vacuum levels at the HVE tip be assessed prior to installation of the DD2011 amalgam separator. In some cases, rerouting the vacuum lines outside the chair may be needed to achieve adequate vacuum levels (before the DD2011 is installed)

There is a draft ISO standard for dental vacuum systems, ISO/PDTS 22595-1. The draft ISO standard calls for an air flow of at least 250 liters/minute (4.1 liters/second) at the HVE tip. Testing of the DD2011 chair side amalgam separator has demonstrated minimal impact on suction quality (0.1 inches of Hg)

Addendum

Prior to the installation of the DD2011 amalgam separator:

1. Verify that the dental chair has an adequate vacuum level. Vacuum levels can be measured with a digital vacuum gauge at the HVE tip. A recommended vacuum gauge is the Dental EZ Flowcheck™. More information at: http://www.dentalez.com/ram_vac/accessories/flowcheck.html

2. An alternative to the Flowcheck™ is the Dental EZ Vacheck™ which is a Pass/Fail device that fits into the HVE tip. Adequate vacuum will hold the device in the HVE when it is turned "upside down" More information on the Vacheck™ is available at: <http://www.dentalez.com/ramvac/accessories/vacheck.html>

3. Before taking vacuum measurements: install a new or "clean" chair side trap in dental chair. There may be several causes for inadequate vacuum levels:

- a. 90 degree fittings on dental vacuum lines can *severely* impact air flow
- b. kinked vacuum hoses
- c. vacuum hoses plugged with debris

4. To improve air flow, vacuum lines can be re-routed outside the dental unit to improve dental vacuum levels

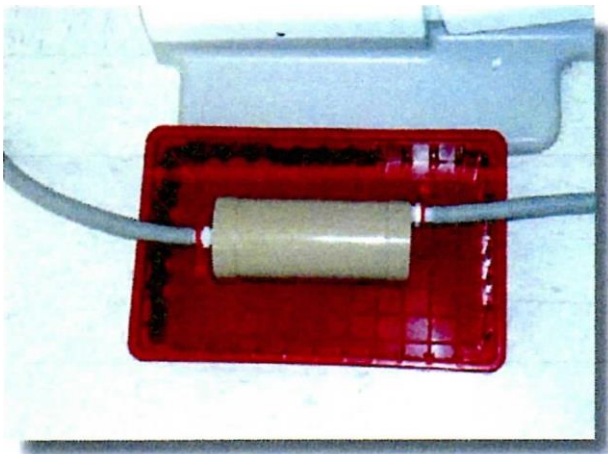
5. Once the vacuum levels have been verified as providing adequate air flow, the DD2011 can be installed. Vacuum levels should be re-measured and recorded in a log book after the installation of the DD2011.

6. Use an appropriate vacuum line cleaner to help maintain dental vacuum lines. We recommend the use of Purevac (Sultan Healthcare, Englewood, N.J.). Purevac is a non-foaming line cleaner that does not substantially mobilize mercury from amalgam.

Instructions for Changing Out the DD2011 Separator



Always wear personal protective equipment when changing/replacing the DD2011 Chair side Amalgam Separator. At a minimum the person changing the separator should wear gloves, protective eye wear, mask, and gown. Any remaining fluid in the separator should be considered potentially infectious medical waste.



The chair side filter/amalgam separator will need to be changed when vacuum levels fall below recommend values (see the manual for additional details). The used filter (still connected to vacuum lines) should be placed in a tray that will collect any spilled wastewater, preventing it from contacting the operatory floor.



The inflow side of the filter is angled up at approximately 45 degrees and the vacuum hose is pulled off the inflow side hose barb. The end of the vacuum lines should be kept in the tray to trap any wastewater that may remain in the lines. Any wastewater that collects in the tray should be disposed of appropriately. DO NOT pour any of the wastewater down the drain since it may contain substantial amounts of mercury. The red vinyl cap is then placed over the inflow hose barb which seals this side of the filter. The filter is then angled at 45 degrees so that the outflow barb is pointed up and the process is repeated. The red vinyl cap then securely placed on the outflow hose barb



Photograph showing the used filter disconnected from the vacuum lines. The red vinyl caps are securely placed on both ends and the used filter is ready for recycling. A new DD2011 amalgam separator can now be installed by placing the vacuum hoses on the appropriate hose barb fittings.