

RAMVAC Recommendations and Limitations

RAMVAC makes recommendations for piping dental vacuum system in the attempt to insure predictable performance and avoid disappointing surprises. There are limitations in insuring predictable performance.

The following information states limitations of RAMVAC recommendations and points out conditions that may affect the appropriateness of recommendations. Failure to read, understand and properly apply our recommendations can lead to disappointments.

What RAMVAC recommendations represent:

1. Expertise in understanding the uses of vacuum in dental treatment
2. Expertise in understanding the required flow (in SCFM) and lifting power (in inches Hg) for acceptable dental vacuum performance
3. Expertise in understanding the limitations in flow and lifting power that can be introduced by:
 - o Common dental treatment room (DTR) vacuum components
 - o Common facility piping components
 - o Length and diameter of piping
4. Expertise in understanding the flow of liquids and gases in dental vacuum piping systems

Limitations of RAMVAC recommendations:

5. RAMVAC does not have expertise in building construction, nor does it have specific detailed information about a specific building's construction; and, therefore cannot provide recommendations for specific pipe and fitting locations.
6. RAMVAC cannot be familiar with all local codes and requirements.

Conditions that affect the appropriateness of RAMVAC recommendations:

1. Performance requirements details, piping details and DTR details not disclosed by the owner/contractor
2. Failure of the owner/contractor to follow written RAMVAC recommendations
3. Failure of the owner/contractor to follow standard plumbing practices
4. Failure of the owner/contractor to request clarification for any RAMVAC recommendation not completely understood or appearing questionable

General Principles for Vacuum Lines

1. Construct vacuum lines as drain lines:
 - o Slope a minimum of 1/4" in 10 feet with low end at tank.
 - o Use drain, waste & vent (DWV) fittings.
2. If an in-line low spot is unavoidable, place it in a known location and incorporate a clean out.
3. For overhead runs, contact RAMVAC.
4. For nitrous oxide scavenging, contact RAMVAC.
5. All work must comply with 2005 NFPA 99c. Refer to RAMVAC Tech Sheet "NFPA-2005 Edition-Level 3 Vacuum".

Notes on RAMVAC Piping Recommendations

1. RAMVAC drawings may not be to scale.
2. Vacuum lines are shown on RAMVAC drawings for general location only.

Please contact RAMVAC Technical Support if you have any questions.



Vacuum Piping

Piping Alternatives

Piping from treatment room vacuum equipment to dental vacuum source equipment can be run in three alternatives configurations, or combinations thereof:

1. Below grade
2. At or slightly above floor level
3. Overhead

As with other decisions, the best alternative is often a best compromise of qualities.

	Below Grade	At or slightly above floor level	Overhead
Advantages	<ul style="list-style-type: none"> ○ Good esthetics -- out of sight ○ Low cost if a concrete floor is not already in place 	<ul style="list-style-type: none"> ○ Often least expensive ○ Easiest to execute 	<ul style="list-style-type: none"> ○ Good esthetics -- out of sight ○ Can be accomplished even with an in place concrete floor
Disadvantages	<ul style="list-style-type: none"> ○ Expensive if a concrete floor is already in place ○ Future access may be limited 	<ul style="list-style-type: none"> ○ Poor esthetics -- pipe visible ○ Not appropriate for traffic areas (doorways) 	<ul style="list-style-type: none"> ○ Disastrous if not executed correctly ○ Often more expensive ○ May require extra strong vacuum producers ○ Access may not be available ○ May require stronger vacuum than operators prefer ○ Requires operator compliance (air must follow liquids)

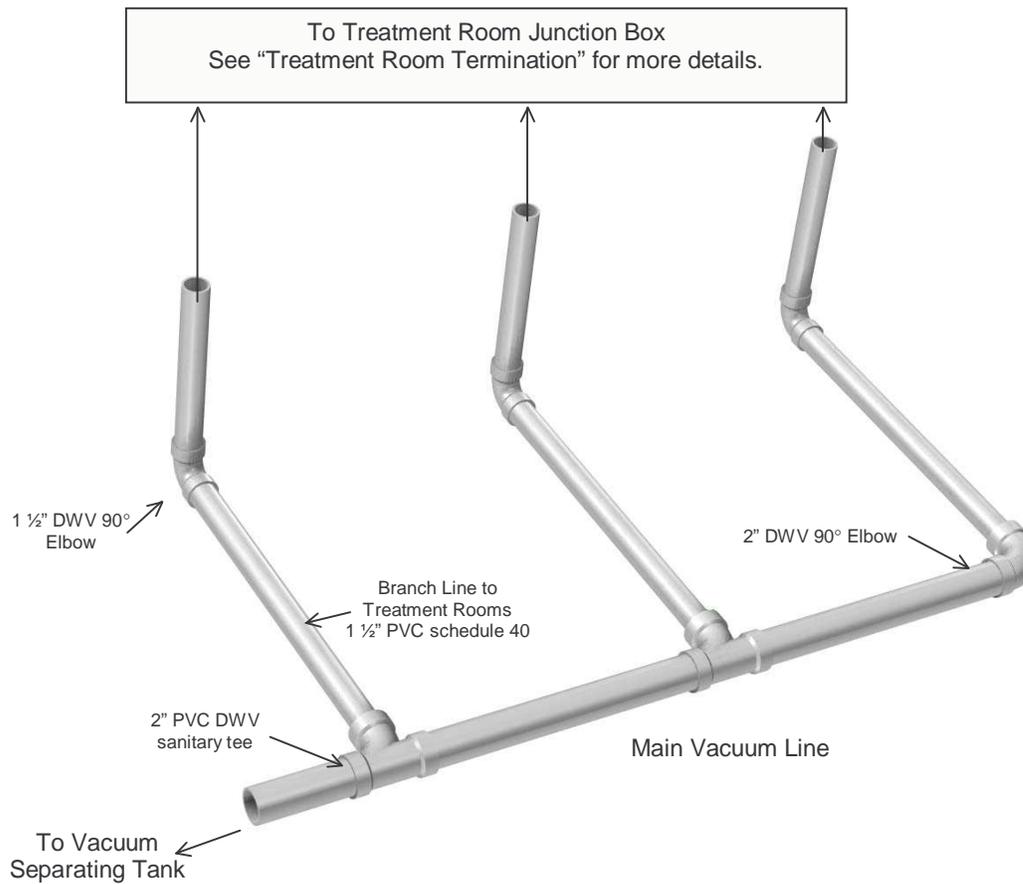
Other Considerations

Pipe Size	<ul style="list-style-type: none"> ○ Minimum 2" for any plumbing poured in concrete ○ Dependent on system size; see RAMVAC plumbing recommendations 	<ul style="list-style-type: none"> ○ Dependent on system size; see RAMVAC plumbing recommendations 	<ul style="list-style-type: none"> ○ See RAMVAC recommendations for essential details
Slope	<ul style="list-style-type: none"> ○ Minimum ¼" per 10 foot of horizontal run 		
Low Spots	<ul style="list-style-type: none"> ○ Place in known location and incorporate clean-out 		
Nitrous Oxide (N ₂ O) Scavenging	<ul style="list-style-type: none"> ○ Must connect to vacuum line separately from chair/unit vacuum 	<ul style="list-style-type: none"> ○ Must connect to vacuum line separately from chair/unit vacuum 	<ul style="list-style-type: none"> ○ See RAMVAC recommendations for essential details



Vacuum Piping

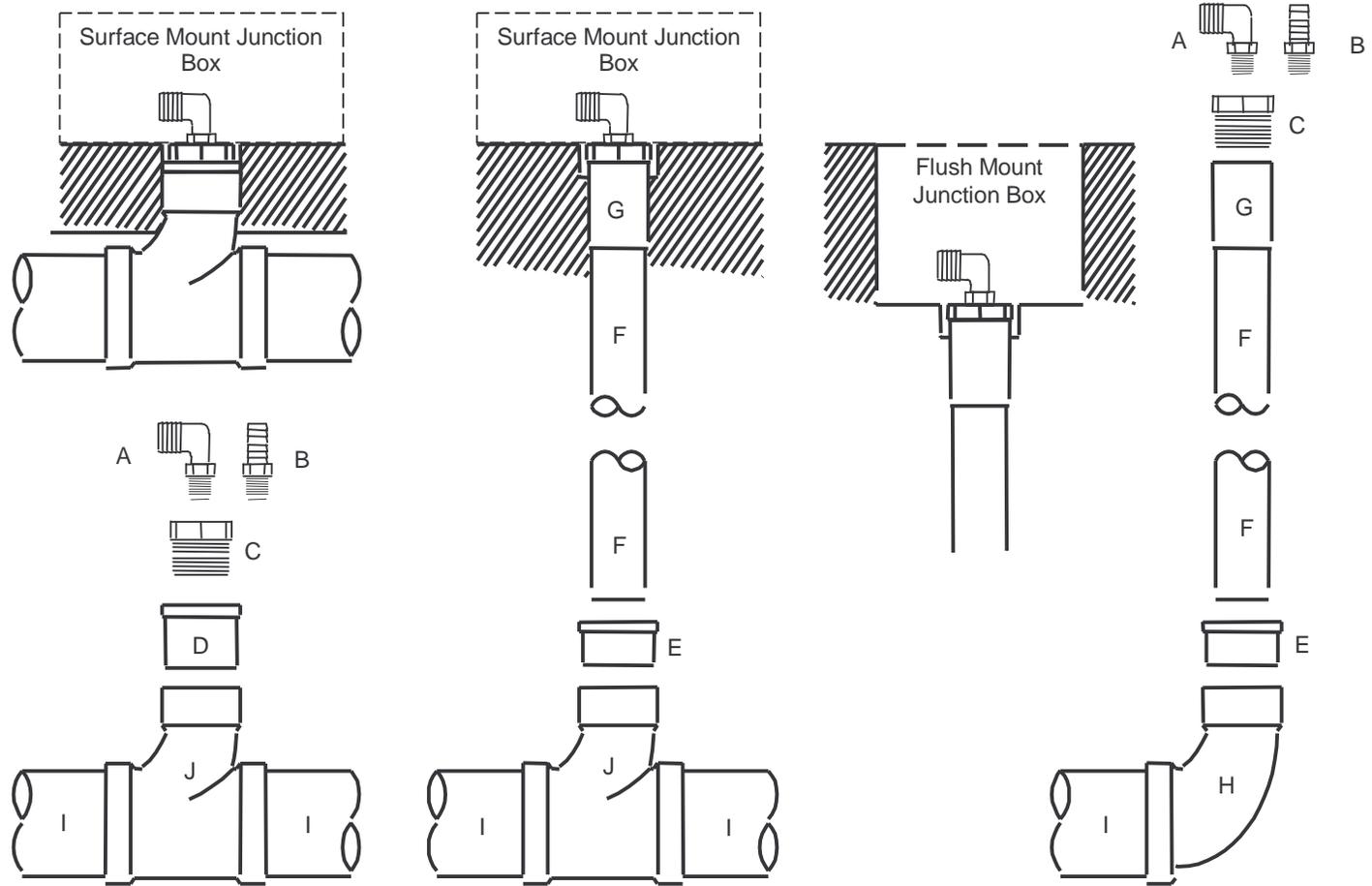
Below Grade Vacuum Piping



- Slope a minimum of $\frac{1}{4}$ " in 10 feet with low end towards tank
- Use "drain, waste and vent" (DWV) fittings
- If an inline low spot is unavoidable, place it in a known location and incorporate a clean-out
- For nitrous oxide scavenging, contact RAMVAC.
- All work must comply with 2005 NFPA 99c
- Place piping in larger size conduit to reduce chance of damage from shifting concrete.

Dental Vacuum Piping

Vacuum Line Dental Treatment Room Termination - Floor Mount Junction Box



A	5/8" Hose x 3/4" mpt 90° Elbow	C	3/4" fpt x 1 1/2" mp t PVC Bushing	F	1 1/2" sch 40 PVC Pipe	I	2" sch 40 PVC Pipe
B	5/8 Hose x 3/4" mpt Straight	D	1 1/2" fpt x 2" PVC Flush Bushing	G	1 1/2" PVC Female Adapter	J	2" PVC DWV Sanitary Tee
		E	1 1/2" x 2" PVC Flush Bushing	H	2" PVC DWV 90° Elbow		



RAMVAC Corporation
3100 First Avenue
Spearfish SD 57783

(800) 5-RAMVAC
(800) 572-6822
(605) 642-4614

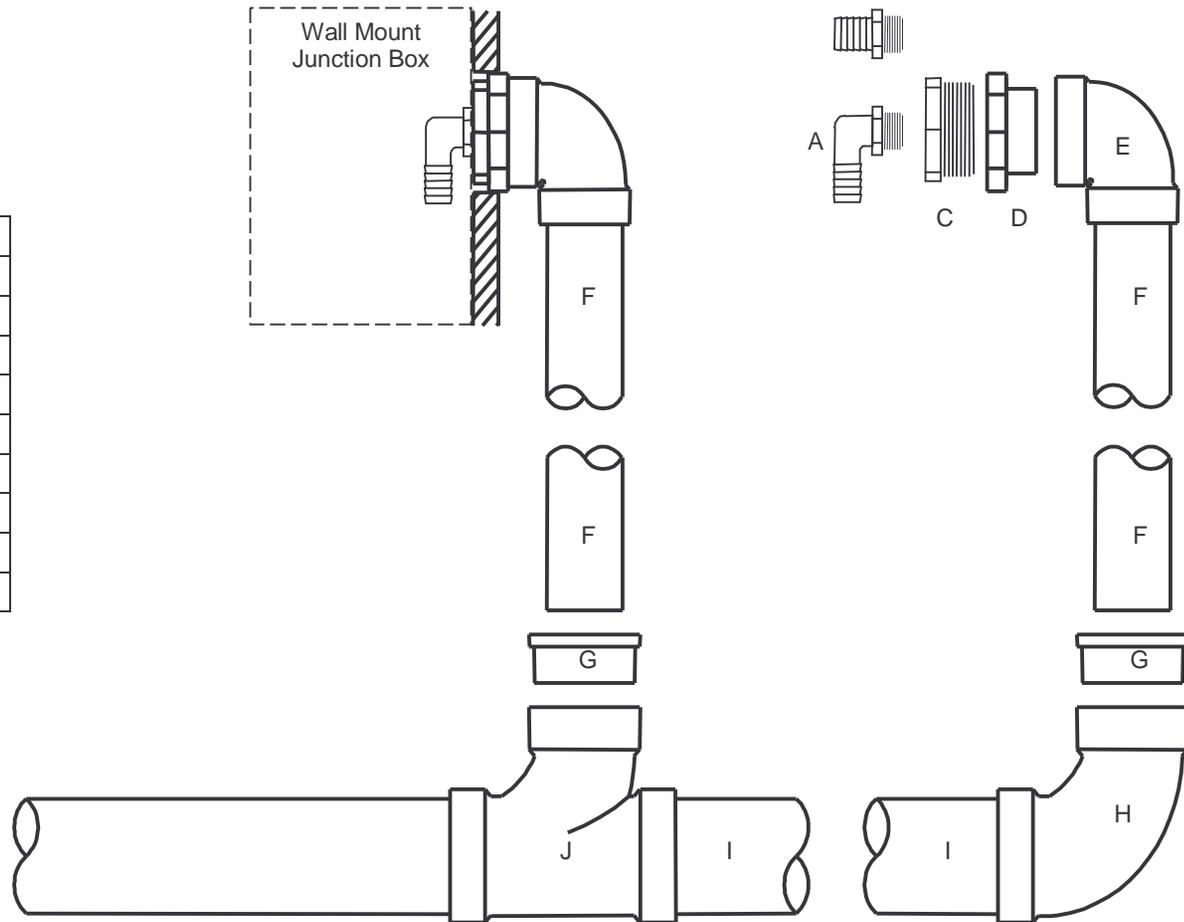
Fax (605) 642-3776
ramvac@ramvac.com

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Dental Vacuum Piping

Vacuum Line Dental Treatment Room Termination - Wall Mount Junction Box

A	5/8" Hose x 3/4" mpt 90° Elbow
B	5/8" Hose x 3/4" mpt Straight
C	3/4" fpt x 1½" mpt PVC Bushing
D	1½" fpt x 1½" PVC Flush Bushing
E	1½" PVC DWV 90° Elbow
F	1½" sch 40 PVC Pipe
G	1½" PVC Female Adapter
H	2" PVC DWV 90° Elbow
I	2" sch 40 PVC Pipe
J	2" PVC DWV Sanitary Tee



Dental Vacuum Piping

Overhead Piping

Ask about running dental vacuum lines overhead and you'll get comments ranging from "Great idea. Saved me a ton of money" to "Whata disaster. I'll never do it again."

For proper operation, all vacuum systems are dependent on proper plumbing and pump sizing. If you make an error in plumbing or pump sizing a system with below grade piping system, vacuum might be weak and operators might grumble. If you make an error in plumbing or pump sizing a system with overhead piping, the consequences are more serious: vacuum may be non-existent and operators can't work -- at all.

In short, using overhead piping is like flying an airplane. You've got a demanding tool with unique capabilities. Use it wrong and Mother Nature, with all the subtleness of a locomotive hitting a toy boat, informs you that you've disobeyed the rules. Errors with overhead plumbing are about as subtle as a crash landing.

Plumbing Rules for Overhead Piping:

- Keep the **vertical lift height as short as possible**.
- The **vertical pipe must tee into the top** of the horizontal line.
- Run the vertical line in 1/2" pipe.
- Run the horizontal overhead line in 1-1/2" or (preferably) 2" size pipe. For more than 5 treatment rooms, consult with RAMVAC.
- Nitrous oxide scavengers must run in a separate vertical pipe and tee into the top of the horizontal line in a separate location from the "wet" vertical pipe.

Pump Sizing Rules for Overhead Piping:

- The vertical lift height must be less than the system's water lifting strength when the required number of vacuum devices are in use.
- The end user must accurately state the number and type of vacuum devices required to be served simultaneously and continuously.
- See vacuum use definitions and values in RAMVAC equipment sizing documents.

Operator Rules for Overhead Piping:

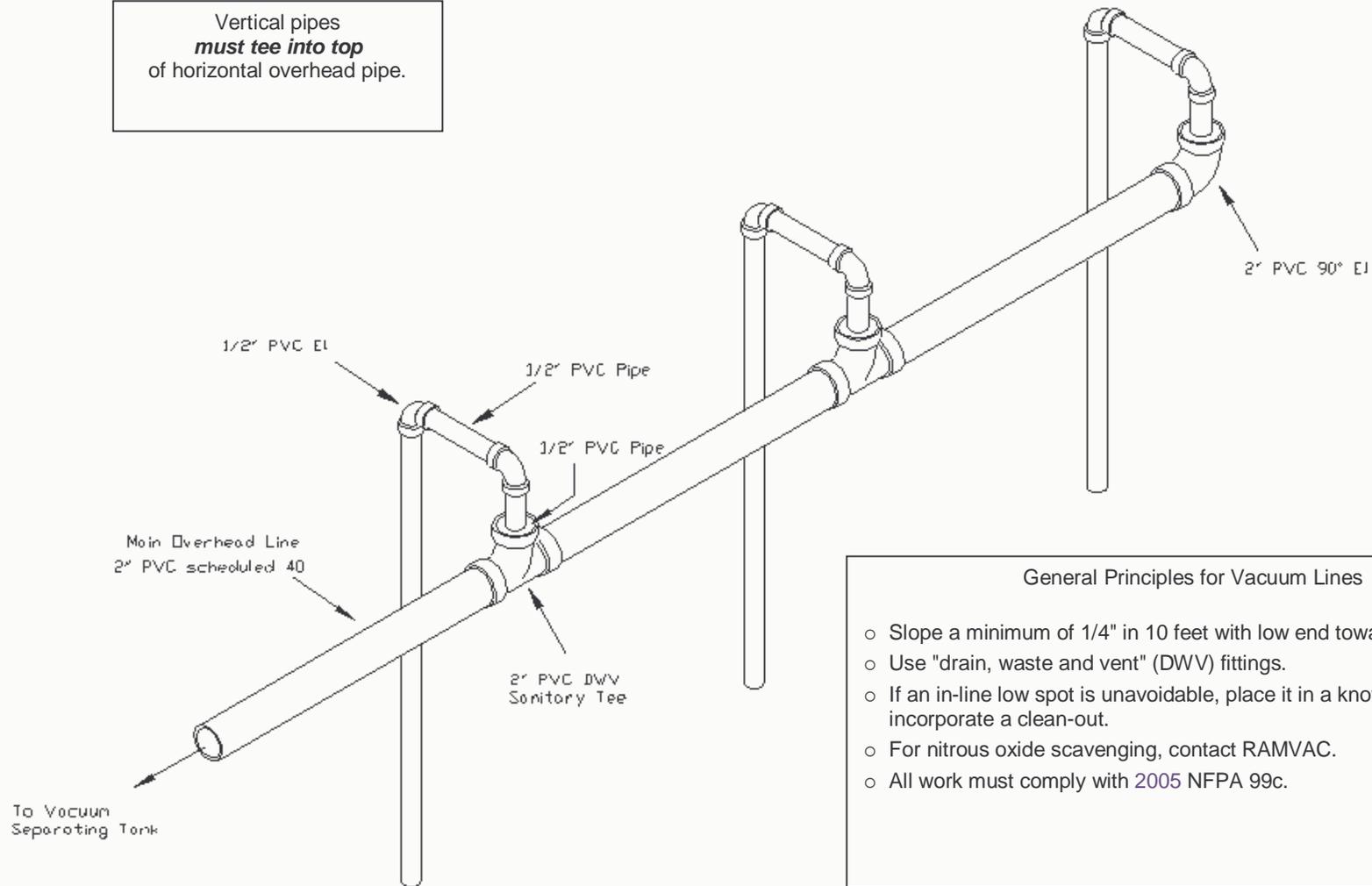
- Operators must allow air to follow liquids before closing vacuum valves.
- Operators must be prepared to work with stronger than "normal" vacuum.



Dental Vacuum Piping

Overhead Piping

Vertical pipes
must tee into top
of horizontal overhead pipe.



General Principles for Vacuum Lines

- Slope a minimum of 1/4" in 10 feet with low end towards tank
- Use "drain, waste and vent" (DWV) fittings.
- If an in-line low spot is unavoidable, place it in a known location and incorporate a clean-out.
- For nitrous oxide scavenging, contact RAMVAC.
- All work must comply with 2005 NFPA 99c.



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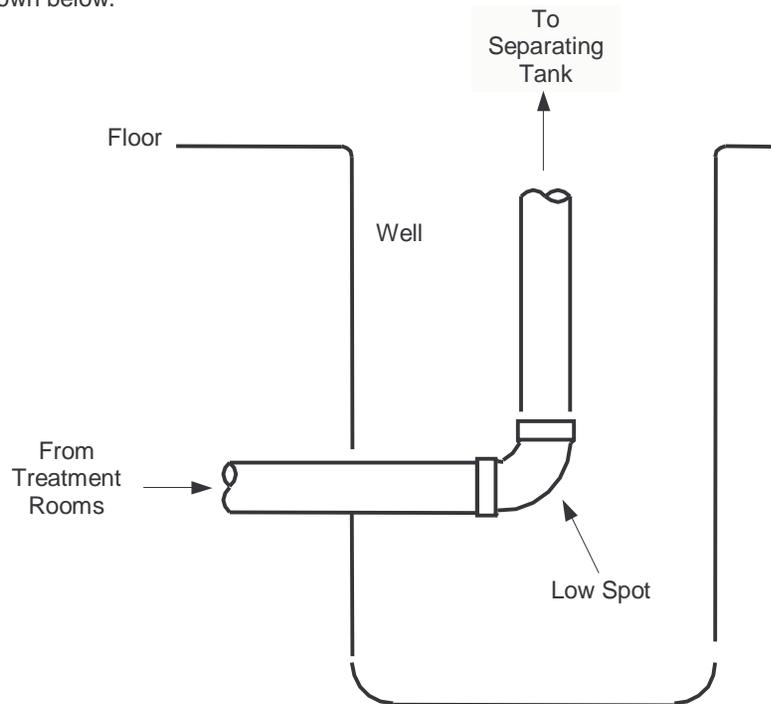
Fax (605) 642-3776
ramvac@ramvac.com

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Dental Vacuum Piping

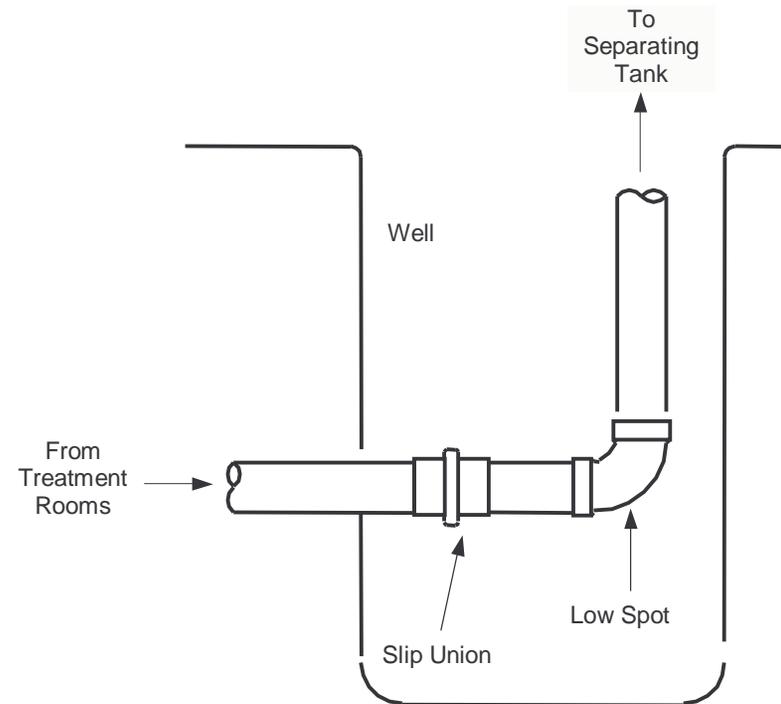
Vacuum Line Low Point

The vacuum line low point is a likely site in a dental vacuum line for a clog. Insure access to this vulnerable point by placing the piping low point in a "well" with a know location. Make the well large enough so that the 90° elbow (the "Low Spot" elbow) that turns the flow upwards can be removed if necessary. Plan for removal by selecting either method shown below.



Cut and Splice Method

3. Construct well large enough to access the pipe from the Treatment rooms so that it can be cut close to the "Low Spot" elbow.
4. If a "Low Spot" elbow clog occurs, cut the pipe and remove the elbow.
5. Attach a replacement elbow using a "No-Hub" connector.



Slip-Union Method

6. Construct well large enough to access the pipe from the Treatment rooms and a Slip Union connecting it to the "Low Spot" elbow.
7. If a "Low Spot" elbow clog occurs, detach the Slip Union and clean the elbow.
8. Reattach the clean elbow with the Slip Union.

