HAZLETON Environmental

*Super Venturi Series*

# Maxi-Strip® 300H Frame

## *Operation & Maintenance Manual*

**Serial Number:** _____ **Date:** _____

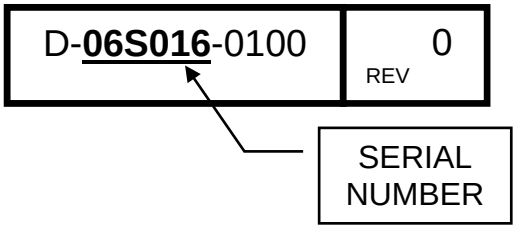
**Buyer's Order Number:** _____ **Revision:** _____

# DESCRIPTION

This manual will assist in understanding the installation, operation, and maintenance of the Hazleton MAXI-STRIP® Single Pass Venturi. The entire manual should be read prior to the installation, operation, or repair of the unit.

## IDENTIFICATION

Each Hazleton Maxi-Strip® System is identified by a six digit alpha-numeric serial number. This number is found on all Hazleton drawings as well as a nameplate attached to the Maxi-tank™. This serial number should be referenced on all spare parts or service requests. The serial number in this example is 06S016. It is good practice to write it on the cover of the manual. Original manuals will have them printed on the cover.




## EQUIPMENT RATING

| | | | |
|---|---|---|---|
| Capacity (GPM) | _____ | Design Head (psig) | _____ |
| Minimum Head (psig) | _____ | Maximum pressure (psig) | _____ |
| Liquid | _____ | Temperature (F) | _____ |
| Specific Gravity | _____ | Viscosity | _____ |
| Gas Flow (ACFM) | _____ | Gas Composition | _____ |

# Table of Contents

# WATER TREATMENT FUNCTIONS

Maxi-Strip Venturi perform three water treatment functions simultaneously:

DEGASSING - AIR STRIPPING - OXIDATION

All of these functions move gases into and out of water by mixing air and water in a special way. Degassing and air stripping move gases from the water to the air and oxidation moves the oxygen in air into the water.

Since air is a crucial part of the treatment process, ensuring sufficient quantity and cleanliness of the air is important. Maxi-Strip Venturi installations should be designed to keep the spent air separate from the fresh air being drawn into the process. Air path losses should be minimized to allow sufficent air to pass through the venturi.

Maxi-Strip are hydraulic venturi - a special type of venturi where the inlet water pressure creates the venturi shape out of the water being treated.

Degassing refers to the removal of gases like carbon dioxide, hydrogen sulfide and methane. These gases cannot be stored as a liquid at room temperature without being pressurized and are often naturally occurring.

Air stripping is the removal of those gases that can be stored as liquids at room temperature. Most often these gases are from petroleum, solvents or industrial chemicals that became dissolved in the water.

Oxidation is where oxygen from the air is dissolved into the water. Oxygen is used to convert dissolved iron or other metals in the water to an insoluble form or solid so it can be removed by filtration.

## HOW IT WORKS

These functions work very similar to the evaporation of water. For example; if the relative humidity is very low (almost no water in the air), water puddles evaporate quickly, regardless of how cold it is. If the relative humidity is very high (air is almost filled with water), the puddles barely evaporate, regardless how warm. If the relative humidity gets too high it rains or the water is “pushed” out of the air.

Each of these gases that can dissolve in water have a relative humidity-like relationship with the air called Henry’s Constant or just Henry’s. If benzene is in the water and the air contains little benzene, the benzene in the water evaporates. Mechanically speed this up and it is called stripping. Use air and it is called air stripping, use steam and its called steam stripping, etc.

Regardless of the function, an adequate supply of fresh air ensures stripping and degassing have plenty of room to “push the gas” into the air or high concentrations of oxygen for oxidation to “push the gas” into the water.

Like evaporation, warm air can hold more gas “relative” to the amount of gases in the water. The colder it is the less gas the air can hold so cold water holds more oxygen relative to the amount or concentration in the air.

# SAFETY

Please read the following sections closely. They point out potential operating hazards associated with this type of equipment.

## SITE HEALTH & SAFETY PLAN

***Hazleton Environmental, Inc. does not provide a Site Health & Safety Plan and is detailing only general potential hazards possibly encountered by use of the supplied equipment.***

## CHEMICAL EXPOSURE

In normal operation an air stripping system is contaminated with VOCs. Contact with the contaminated water may require decontamination as dictated by the Site Health & Safety Plan. Degassing and oxidation systems typically don't have contamination.

## OXYGEN DEFICIENCY

Confined space in a typical Maxi-Strip System is the degassing sump and or clearwell. These are typically inaccessible to the operating personnel during normal operation and usually don't require maintenance. An oxygen deficient atmosphere can be formed within any confined space presenting a hazard to the operating or maintenance personnel. Proper adherence to confined space entry rules should be strictly followed. Empty tanks should never be entered for maintenance unless the tanks have been properly vented, certified to be safe, appropriate safety equipment is on hand and personnel are properly trained.

## SAFETY HAZARDS

Leaks or splashing are potential hazards in any water system. Proper safety and personal protective equipment should be used when performing any work on the Maxi-Strip System. Movements should be deliberate as the work area may be wet and slip hazards exist.

## ELECTRICAL HAZARDS

There is always potential for dangerous contact with electrical elements around water treatment equipment. While the Maxi-Strip Venturi do not use electricity, most installations have some type of pump motors, instrumentation, control panel, lights or recepticles. All of these items present a potential electrical hazard.

## CONFINED SPACE DISCUSSION

It shall be the responsibility of the Site Health & Safety Manager to take all precautionary measures necessary for safe confined space entry. The supervisor in charge will have the responsibility for initiating the confined space entry permit and verifying that all requirements for entry are met before allowing anyone into a confined space. Employees are responsible for the guidelines set by the site management.

### DEFINITIONS

Confined-Space — Is large enough and so configured that an employee can bodily enter and perform assigned work; and

Has limited or restricted means for entry or exit (for example, tanks vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and

Is not designed for continuous employee occupation.

Oxygen Deficiency — An atmosphere having an oxygen concentration of less than 19.5 percent by volume.

### HAZARDS

Hazards commonly encountered are:

- Insufficient oxygen
- Electric shock from portable lights, tools or assorted electrical equipment.
- Inadvertent starting of pump and/or opening valves leading in or out of tanks or vessels.
- Physical hazard such as slipping, falling and falling objects.
- Physical deficiencies causing collapse due to fatigue, low-resistance to temperature extremes, colds and general poor health.

### OPENING MANWAY CLOSURES

Manways are used to provide access to inside of tanks and closed vessels for inspection, cleaning or other purposes. When a vessel is being used, the manway is tightly closed. Several closure methods are used - some have clamps or bolts. A gasket provides a tight seal between the manway cover and the vessel.

***WARNING***

### BEFORE OPENING A MANWAY

1. Be sure that eye wash basins and safety showers are available and working.
2. Shut down the facility. Close and tag all valves to the tank.
3. Leave a vent open.
4. Drain all liquid from the vessel.

5. Tag the control panel OUT OF SERVICE.
6. Remove or open cover.
7. Secure the manway cover with a davit, hinge lock, rope or chain or remove from work area around the opening.

**ENTERING AN EXCLOSED SPACE**

Before entering a tank or vessel:

1. Be sure that eye wash basins and safety showers are available and working.
2. Wear appropriate protective equipment (as required)

   An adequate safety line

   An air fed mask, safety glasses or face shield

   Gloves

   Protective clothing, hard hat and shoes
3. Notify the appropriate Safety Personnel and obtain a vessel entry permit if required.
4. Notify the Safety Department and request a gas check.
5. Be sure that all valves to the tank are closed and tagged Vents should be left open. Most automatic valves have a manual hand wheel shut off. Some systems have separate manual shut off valves. Tag and lock the valves in the safe position. Blank all pipelines entering or leaving the vessel.
6. Be sure that the control panel is tagged OUT OF SERVICE.
7. Be sure that adequate ventilation is supplied. Use blowers or suction fans. Allow sufficient time for the inside of the vessel to be completely ventilated.
8. Before entering, inspect the internal construction for:

   Adequate footing

   Slippery media

   Footing that could collapse

   Objects that could fall

   Sharp or jagged parts

   Equipment, which should be avoided to prevent breakage
9. Be sure that a safety man is outside the tank with visual (or other) contact with you at all times.

# OPERATIONS

Single Pass Systems have only five components:

Pressurized raw water supply
Fresh air supply
Maxi-Strip Venturi
Treated water sump or tank
Spent air outlet or stack

Hazleton's Maxi-Strip venturi contain no moving parts. Energy is taken from the pressure in the water supplied to the venturi to drive the treatment process.

The "health" of the venturi can be determined from its pressure gauge. (See Equipment Rating at the beginning of the manual)

- High pressure indicates fouling is taking place and may impact treatment efficiency.
- Low pressure indicates excess leaks from incorrect venturi assembly or damaged gaskets. Low pressure on a healthy venturi may be caused by upstream issues like pump or pipeline trouble.

Regardless of the water treatment function, degassing, air stripping or oxidation, the Maxi-Strip requires clean fresh air to work.

*Ensure air is flowing into (or out of) the Maxi-Strip System.*

No controls are used for the Maxi-Strip. It operates whenever pressurized water is supplied. Typical system controls are associated with well or feed pump operation and tank level.

## INITIAL START-UP

Initial startup should be done anytime major maintenance or an extended outage has taken place.

**PLEASE NOTE: PRIOR TO CHARGING THE MAXI-STRIP WITH LIQUID, ENSURE THAT DEBRIS IS FLUSHED FROM THE PIPING AND THE TREATED WATER TANK IS CLEAN.**

1. Check mechanical piping and equipment for proper assembly and problems.
   a. Follow the entire air and water path ensuring that nothing is missed.
   b. Close all sample ports.
   c. Check the hose couplings to verify the “Camlok ears” are fully engaged.
   d. Touch each venturi assembly latch to make sure they are tightly clamped.
2. Verify Lockout/Tagouts are cleared for operation.
3. Use reduced flow to charge the system with liquid and purge air from the raw water piping. Reduced flow fills can be performed by throttling with a valve, discharging though a flush drain, running the feed pump at reduced speed or “bumping” the feed pump until the lines are filled.
4. Start the well pump or open water supply.
   a. Check the venturi and piping to assure there are no leaks.
   b. Check and record the pressure gauge readings for future reference.
   c. Check the treated water tank for flow.
   d. Check the stack or air inlet for flow.
   e. Verify well and chemical pump operation.

## OPERATING CHECKS

1. Verify flow to the plant.
2. Visually looks for leaks.
3. Check pressure gauge.
4. Verify air flow.
5. Inspect treated water for TDS, staining, deposits, sheen or odor.

# PROBLEMS / TROUBLE SHOOTING

| Troubleshooting | | |
|---|---|---|
| **PROBLEM** | **PROBABLE CAUSE** | **REMEDY** |
| Flow too Low | 1. Maxi-Strip® Unit plugged<br>2. Low water pressure to unit (pressure below 18 psi) | 1. Clean debris screen; disassemble and clean unit<br>2. Check well pump, piping |
| Maxi-Strip® not Meeting Required Performance | 1. Maxi-Strip® Unit plugged<br>2. Low water pressure to unit (pressure below 18 psi)<br>3. Discharge stack blocked<br>4. Low air flow to the Stripper (<1000 ACFM) | 1. Disassemble and clean unit<br>2. Check well pump, piping<br>3. Check off-gas ducting for blockage, icing, nests, etc.<br>4. Check inlet air filter. |
| Maxi-Strip® Venturi Leaking | 1. Loose Clamps<br>2. Debris in Maxi-Ring<br>3. Damaged Seal<br>4. Incorrect Assembly<br>5. Damaged or cracked parts | 1. Shut off well pump; retighten clamps<br>2. Disassemble and clean unit<br>3. Replace seal<br>4. Reassemble correctly<br>5. Replace failed parts |

# MAINTENANCE

The Hazleton Maxi-Strip® System is designed to be a low maintenance system providing years of service. In most installations the Maxi-Strip® Venturi or "Heads" are mounted on a durable concrete tank or sump. The venturi contain no moving parts and are constructed of rugged thermoset polyurethane, stainless steel or cast iron and high performance elastomers. The 300H Super Venturi is specifically designed for easy maintenance.

## PREVENTATIVE MAINTENANCE

With no moving parts, there is very little preventive maintenance. It is important to keep the system clean and prevent debris from entering the head. A regular cleaning schedule should be setup based on site conditions.

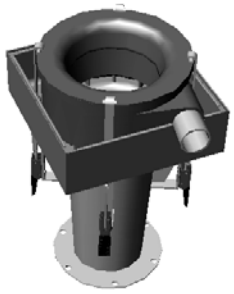
1. Check the air inlet filter and replace when dirty
2. Clean the debris screen quarterly or when a pressure increase is noted on the gauge.

## MAXI-STRIP® MAINTENANCE

If maintenance becomes required, it is most likely caused by over-size particles clogging the debris screen or internal jet orifices. If cleaning the debris screen does not relieve high pressure, disassembly and cleaning of the orifices or changing the Maxi-Ring and seals is required.

Each Maxi-Strip® head weighs approximately 320 pounds. Extreme care should be taken when working on these units. The weight of each individual part normally removed during maintenance is listed below:

| | |
|---|---|
| Air Hood Base (03) & Spool piece (01) | 200 lbs. |
| Primary Inlet Nozzle (05) | 53 lbs. |
| Deflector Plate (13) | 27 lbs. |
| Air Hood (14) | 35 lbs. |
| | **320 lbs.** |



**MAXI-STRIP 300H Super Venturi**

The Model 300H can be easily disassembled in place without special tools. If air is piped to the venturi, a nut driver or screw driver may be required to loosen the flexible coupling that connects the duct to the inlet air phlenum called the Air Hood.

## Disassembly

Please refer to exploded parts diagram at the end of this manual.

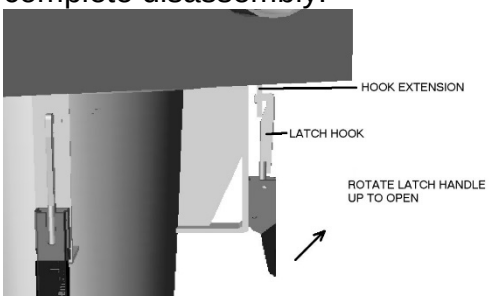
To prepare the venturi for disassembly the Air Hood (14) must be removed. Unlatch the four Air Hood Latches (15) from the Base Plate (03) and lift the Air Hood from the Base Plate. Maxi-Strip can be operated with the Air Hood removed to check performance. Be cautious during operation without the hood to avoid spray from any leaks. Use appropriate personal protection equipment.

Observe all safety and Lockout/Tagout procedures. Ensure all water supply to the unit is off and cannot be repressurized during maintenance.

Open the camlok fitting connecting the hose to the venturi and remove. Be careful not to drop the fitting and hose as it may be bent out of round. Remove the debris screen (7) and clean. If plugged, this may be all the maintenance required to restore pressure.

If used, remove the safety latch pins (2B) from the four draw latches (2). The venturi is now ready for disassembly.

Opening the four main clamp draw latches (2), unhooking the extensions(12) and un-stacking the components (13/8, 11, 10, 9) provides a complete disassembly.




***Four 1,000 pound force draw latches (2) secure the assembly together. The draw latches must be opened in the proper sequence to prevent injury.***

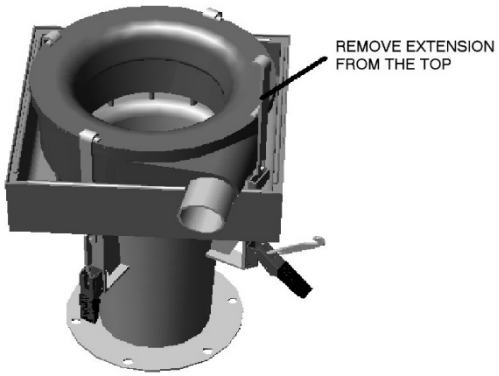
Disassembly is easiest with two people, but safe disassembly is possible by a single person

Clamp draw latch opening with two people:

Open two of the opposing clamp latches. Open the last two opposing latches at the same time.

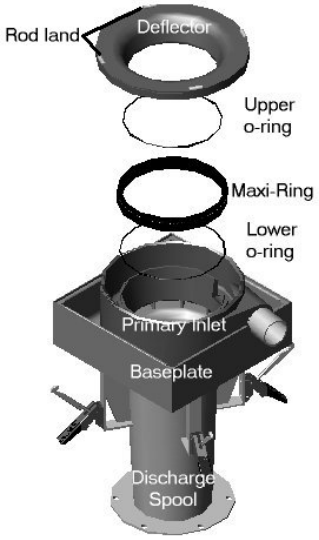
Single person maintanence

To relieve the clamp pressure, open the draw latch closest to the hose connection as shown. Rotate the latch hook (2C) one revolution counter-clockwise to loosen it and relatch. Repeat this first on the opposite latch then either adjacent latch and its opposite latch. Repeat starting with the first hook. Return again to the first hook and open it, leaving it hooked to the extension. Open the opposite latch, then open the remaining two latches and unhook the latch hooks from the Latch Hook Extensions (12). Remove the latch hook extensions from the deflector plate (13). The Maxi-Strip is now ready for complete disassembly.



***Care should be taken not to damage any gaskets or seals. Damaged or worn gaskets must be replaced.***

***The center of the Maxi-Strip is open to the tank. Avoid dropping parts into the tank.***

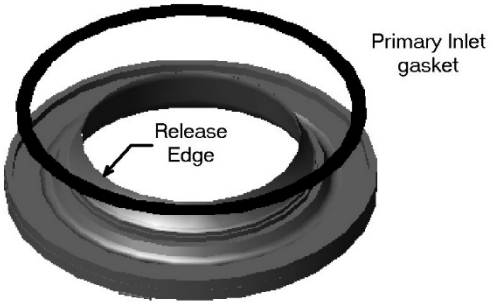



Carefully lift the deflector plate (13) off the primary Inlet nozzle (05). Be careful not to damage the deflector plate. **Do not** set the deflector plate on its sharp bottom edge (release edge). If the sharp edge is damaged or dulled by mishandling the performance of the stripping unit is impaired.

Remove the upper Maxi-Ring 'O' ring (11) from the groove in the top of the Maxi-Ring (10). Remove the Maxi-Ring ring (10). Remove the lower Maxi-Ring 'O' Ring (09).

The Primary Inlet Nozzle (05) can be lifted from the Air Hood Base Plate (03) for cleaning or replacement, but it is un-necessary for most maintenance. The unit is now completely disassembled.

The main assembly pressurized water seal is the primary inlet gasket (08). The gasket is secured to the deflector with ordinary silicon RTV sealant. If the gasket is damaged or deformed where it might jeopardize a good seal, it can be reused once by pulling it free from the deflector and turning over, exposing an undamaged surface. Replace when both surfaces are damaged or deformed.




To install a new primary inlet gasket or reinstall a used gasket, ensure the deflector seal area is clean and dry. Place a single, continuous 1/8" bead of silicon sealant approxiamtely ½ inch in from the edge of the deflector seal area. Position the gasket (good side up) onto the sealant and press around the gasket until it is engaged evenly. The gasket should be approximately 3/32" smaller than the gasket restraint ring molded into the deflector. Position the gasket to have a relatively even gap all around. This gap is necessary for gasket expansion when it is displaced by the clamping pressure. Allow the newly gasket deflector to set for 5 to 15 minutes before assembly.

## Assembly

Always start with clean parts free from debris or grit as these may defeat or damage the seals. Assembly is the reverse of disassembly.

Place the primary inlet nozzle (05) on top of the base plate (03) in the grooves provided. The unit should not be forced to seat. Ensure the "pipe" inlet is in the half round opening in the baseplate and slide the primary around until it drops into place. Insert the lower

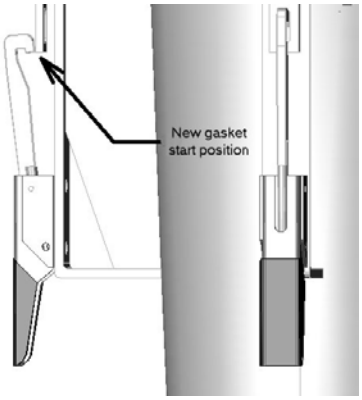
Maxi-Ring ‘O’ ring (09) around the Maxi-ring locator stub groove provided in the primary inlet (05).

Place the Maxi-Ring (10) over the stub in the primary inlet (05) and onto the lower ‘O’ ring (09) Place the upper Maxi-Ring ‘O’ ring (11) in the groove on top of Maxi-Ring (10).

Carefully place the Deflector Plate (13), with the stainless rod lands up, on the primary inlet (05) and Maxi-Ring (10). Rotate the Deflector until the rod lands line up with the openings in the baseplate for the latch hook extensions.

***Make sure all gaskets and assembled parts fit properly and are properly aligned before proceeding to latch the unit.***

Insert the latch hook extensions (12) and hook the draw latches (02) into the bottom of the extensions. Clamp one Draw Latch (02) so that it just holds the deflector plate (13) level. Move to the latch directly opposite this latch and latch it with half force (approx. 10 lbs. force). Repeat this procedure with the other draw Latches (02). Finally, re-clamp the first draw latch with the full load force of 20 lbs, then the opposite latch, etc. Insert all latch pins (2B) if used. The unit is now assembled.




If two people are available, or the adjustment position of draw latch hooks (02) is lost, realign the latch hooks to the new gasket start position. This is done by adjusting the latch hooks until the bottom tip of the latch hook is even with the bottom of the latch hook extension. Proceed with latching the unit, opposite latches together, adjusting the hook until proper tension is used to latch the unit.

## Removing Entire Assembly

To remove the stripping unit from its mounting position, disconnect the hose from the inlet. Make sure the unit's draw latches (02) and pins (2B) are secured properly before loosening any mounting bolts. This will ensure the unit stays latched during removal and transport.

Loosen and remove the stripping unit mounting bolts between the tank flange and the spool piece flange (01). Remove the inlet air ducting (14). The unit is now ready to be lifted from its mounting flange and placed in an upright position on a level surface.

# STORAGE

## SHORT TERM

**(Less than 60 days)**

The tanks with attached pumps and strippers should be stored in a dry location and be protected from dirt. Parts subject to attack by moisture should be inspected periodically and coated with lubricant or rust inhibitor as needed.

## LONG TERM

**(60 days or more)**

The air stripping equipment must be dried and can be stored in place, provided the building remains a dry location. Drain the remaining water from the tanks and use a "wet-vac" to remove the final amounts of water from the tanks.

# SPARE PARTS

A complete record of your HAZLETON Air-Stripping System is kept on file at the factory; however, to place an order for a part the following information must be provided to your local HAZLETON representative or to the factory at:

Hazleton Environmental, Inc. Phone: (570) 454-7515
25 Jaycee Drive FAX: (570) 454-7520
Hazleton, PA 18202

### PLACING ORDERS

Information required on parts orders:

1. Model number 300H
2. Serial number 06S016
3. The item number, part description, and quantity required.
3. Your company name, address and zip code.
4. Specify the billing and shipping instructions.
5. List the delivery date required.

## SUGGESTED SPARE PARTS

Hazleton Environmental, Inc. recommends that you keep spare parts on hand if continuous operations are critical. These parts are:

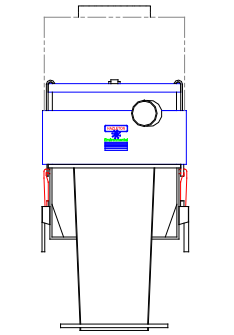
1. One set of 'O' rings and gaskets for the Maxi-Strip® Venturi.

| | |
|---|---|
| Upper Maxi-Ring Seal | 50249-R1 |
| Lower Maxi-Ring Seal | 50250-R1 |
| Primary Inlet Seal | 50279-R1 |

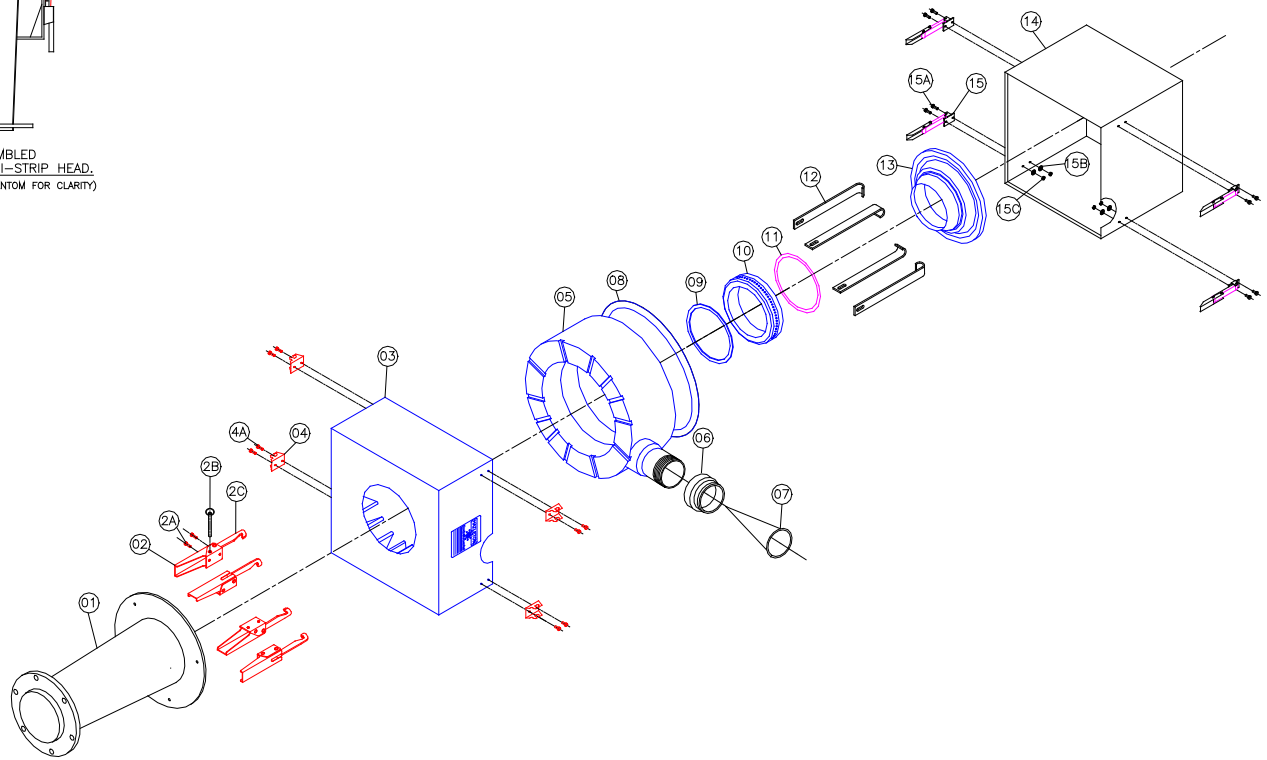
2. One set of internal rings for the Maxi-Strip® Venturi

Maxi-Ring Special

| Hazleton Environmental, Inc. | | | **PARTS LIST** |
|---|---|---|---|
| Title: | **Standard Single Pass Unit** | Spec. No. | **M300H SP** |
| Project: | **None** | Page No. | **17 OF 18** |
| Date Rev: | **8/12/07** | Rev. No. | **1** |



FULLY ASSEMBLED
MODEL 300H MAXI-STRIP HEAD.
(AIR HOOD SHOWN IN PHANTOM FOR CLARITY)



| Hazleton Environmental, Inc. | | | **PARTS LIST** |
|---|---|---|---|
| Title: | **Standard Single Pass Unit** | Spec. No. | **M300H SP** |
| Project: | **None** | Page No. | **18 OF 18** |
| Date Rev: | **8/12/07** | Rev. No. | **1** |

| COMMON PARTS LIST | | | | | |
|---|---|---|---|---|---|
| TAG NO. | STOCK CODE | QTY. | DESCRIPTION | MATERIAL | PRICE EACH |
| 01 | 50266-R4 | 1 | SPOOL PIECE | STEEL | |
| 02 | 10196 | 4 | CLAMP DRAW LATCH | STEEL | |
| 02A | 10197 | 8 | CAP SCREWS | 304 SS | |
| 02B | 10198 | 4 | LOCKING PIN | 304 SS | |
| 02C | 50177-R0 | 4 | DRAW LATCH HOOK | 304 SS | |
| 03 | 50083h | 1 | AIR HOOD BASE PLATE | POLYURETHANE | |
| 04 | 10053 | 4 | DRAW LATCH KEEPER | STEEL | |
| 04A | 10111 | 8 | CAP SCREWS | 304 SS | |
| 05 | 50277-R0 | 1 | PRIMARY INLET | POLYURETHANE | |
| 06 | 10176 | 1 | 4” QUICK DISCONNECT | BRASS | |
| 07 | 50183-R0 | 1 | IN-LINE SCREEN | 304 SS | |
| *08 | 50279-R1 | 1 | PRIMARY INLET GASKET | BUNA-N | |
| *09 | 50250-R1 | 1 | MAXI-RING LOWER O-RING | BUNA-N | |
| 10 | 50268-R0 | 1 | MAXI-RING | HDPE | |
| *11 | 50249-R1 | 1 | MAXI-RING UPPER O-RING | BUNA-N | |
| 12 | 50176-R0 | 4 | LATCH HOOK EXTENSION | 304 SS | |
| 13 | 50080-R0 | 1 | DEFLECTOR PLATE | POLYURETHANE | |
| 14 | 50281-R1 | 1 | AIR HOOD | 304 SS | |
| 15 | 10053 | 4 | AIR HOOD LATCH | STEEL/RUBBER | |
| 15A-C | 10111-3 | 8 | DRAW LATCH FASTENERS | 304 SS | |
| | | | | | |
| | | | | | |
| | | | | | |
| * | 300H SLKT | 1 | * MAXI-STRIP 300H SEAL KIT | | |