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Introduction

AIRLANCO, along with all of our employees, thanks you for selecting us to fulfill your needs for environmental control equipment.

RLP filters provide a mechanically simple, efficient, and economical means to separate particulate from a gas stream. The absolute minimum of moving parts enhances the efficiency and durability of the system. This manual will provide the information needed for an operator or maintenance technician to understand the process of fabric filtration and the mechanical operation of your AIRLANCO filter. Understanding these basic principles will assure that this filter will provide years of dependable service with minimum maintenance.

Receiving Your Equipment

A visual inspection of your equipment should be performed before it is removed from the truck. Dents, scratches, and other damage should be noted and photographed. The structural integrity of the filter housing will be adversely affected by dents. AIRLANCO should be immediately notified of any structural damage to your equipment. Packing lists should be checked thoroughly and shortages should also be reported to AIRLANCO. It is the purchaser’s responsibility to file shortage reports and damage claims with the carrier and the supplier. The carrier is responsible for any damage to the equipment while it is in transit.
Safety Precautions

Warnings

• Do not operate this equipment without guards, access doors, and covers secured.
• Lock out power before servicing this equipment.
• This equipment is automatically controlled and will start at any time without warning.
• Do not enter clean air plenum while system fan is operating. Airflow can pull service door closed causing severe injury or entrapment.
• OSHA considers some filter housings a confined space. Follow procedures set forth by your safety administrator.

⚠️ FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE!
⚠️ READ AND UNDERSTAND SAFETY DECALS! (see below)
Definitions

ACR  
Air to Cloth Ratio. The velocity at which a gas moves through filter media. Divide the gas volumetric flow rate (cfm) by the total area of filtration media in (sq. ft.)

Agglomeration  
To gather into a mass.

Bag  
Filter element, sock. Usually supported by a wire cage.

Blinding  
Filter media becomes air impermeable due to moisture, temperature, or other causes.

Cake  
Agglomeration of dust particles on the surface of a filter element.

Can Velocity  
Upward speed of air moving through a filter housing (fpm). Divide the gas volumetric flow (cfm) by the cross sectional area of the baghouse (sq. ft.)

Cartridge Filter  
Filter element consisting of a pleated filter media supported on a steel or plastic skeletal frame.

CFM  
Cubic Feet per Minute – gas flow rate.

Clean Air Plenum  
Section of a baghouse directly above the tubesheet and filter bags or cartridges.

Dew Point  
The temperature at which water vapor in a gas will condense into a liquid state.

Filter Cake  
The accumulation of dust on a filter element before cleaning. This cake assists in the filtration of dust.

Filter Element  
Refers to a filter bag or cartridge.

Header  
The pressurized pipe that contains the compressed air supply for pulsing.

Inch of Water  
A unit of pressure equal to the pressure exerted by a column of water one-inch in height at a standard temperature. 27.7 in. wg. = 1psi.

Interstitial Velocity  
The apparent velocity of a gas as it passes through the filter element matrix. It is found by dividing the gas flow rate (cfm) by the cross sectional area of the filter housing less the area occupied by the filter elements.

Pressure Drop  
The resistance of flow of a fluid between two points.

Pulse Duration  
The length of time a cleaning pulse lasts.

Pulse Frequency  
The time between pulses in a baghouse cleaning system.

Pulse Jet  
Generic name given to all pulsing dust collectors.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purge Pipe</td>
<td>Pipe with holes in it that extends into a filter clean air plenum and delivers cleaning air from the header to the filter elements.</td>
</tr>
<tr>
<td>Re-entrainment</td>
<td>The phenomenon whereby dust is collected from the air stream and then is returned to the air stream. Occurs when dust is pulsed from a filter element and then caught by an upward moving air stream.</td>
</tr>
<tr>
<td>Seeding</td>
<td>The application of a relatively coarse, dry dust to a filter element before start-up to provide an initial filter cake for immediate high efficiency and to protect filter elements from blinding.</td>
</tr>
<tr>
<td>Tubesheet</td>
<td>The steel plate from which the filter elements are suspended. Separates the clean air and dirty sections of the baghouse.</td>
</tr>
<tr>
<td>Venturi</td>
<td>Device used to increase the efficiency of a compressed air pulse.</td>
</tr>
</tbody>
</table>
The Filtration Process

Filtration is a dry method of particulate collection in which an array of many individual targets is assembled into a porous structure through which aerosol-laden gas is passed. In a filter, the collection target is the filter media. Inertial, diffusional, electrostatic, and direct interception are the primary forces that influence the collection of dry particulate on the filter media. As collection proceeds, particles impinge upon previously collected particles and a deposit is built up which in turn becomes the principal collection medium. This agglomeration of particles is referred to as a “filter cake”. Filtration efficiency is not maximized until this filter cake has formed.

As the dust cake builds on the filter element surface it becomes increasingly difficult for the gas to pass through the element. A differential pressure gauge mounted on the filter measures the force required to move air through the filter media. Normal pressure drop for a filter will fall in the range of 1 to 5 inches of water after the elements are broken in. The differential pressure reading will increase as the elements get dirty. Eventually the dust cake must be removed from the filter element surface or airflow will fall to unacceptable levels.

RLP filters are continuous self-cleaning units. A flow of low-pressure air from a centrifugal fan is injected into each bag at periodic intervals. This air is distributed to each row of filter bags through a rotating arm. Refer to cleaning mechanism drawing 10532 on page 19. The low-pressure reverse flow of air from the fan gently cleans each bag. A percentage of the dust cake will fall away from the bag into the filter hopper. It is normal for some of the dust to re-entrain onto the bag. The rotating distribution arm turns at approximately 1 rpm. This slow speed virtually eliminates wear to moving parts and seals. A ¾ HP gear motor drives the arm with a chain drive. The gear motor and fan motor are explosion proof. The fan is a 3450 RPM direct drive fan requiring 460/230/60/3 AC. Exact replacement parts can be obtained directly from AIRLANCO in Falls City, NE. (1-800-500-9777).

High Temperature Precautions

Moisture is one of the most predominate causes for fabric filter failures. Care must be taken in applications involving high humidity gas streams. Dryers and other combustion processes pose the greatest danger for condensation in the filter. The filters and gas stream temperatures must be maintained at 50°F above the dew point of the gas stream. Excursions near or below the dew point of the gas stream will result in condensation of the gas on the baghouse and filter media. This moisture will change the desired dust cake into an undesirable mud cake, which is difficult to remove, and may permanently damage the filter media. Corrosion is also intensified under these conditions. Filters operating under high humidity conditions at any temperature should be protected from gas condensation. This will require heating the filter to 50°F above the gas stream temperature and insulation of the filter and ducting. Failure to take these precautions will result in unsatisfactory performance of the equipment and possible catastrophic failure of the filter media.

Mechanical Operation

AIRLANCO RLP filters are available with either continuous or “on demand” cleaning controls. Cleaning frequency can be controlled with a Dwyer Photohelic® pressure switch, which will conserve energy, reduce bag wear, and lower emissions by maintaining a set pressure drop across the filter bags. Filter bags are made from felted fibers and are supported on a rigid wire cage. The composition of the fiber will vary depending on the dust and gas chemistry, temperature, and gas stream humidity. Consult AIRLANCO Engineering (800-500-9777) for further information on the characteristics and types of available filter media.

Bags are suspended in the filter from the tube sheet. The bag snaps into the tube sheet hole and is self-supporting. A wire cage is then slipped into the bag and its top collar rests on top of the tube sheet (refer to pg 6 for illustration).
Dust is collected on the surface of the filter bag and eventually forms a dust cake. When the cleaning arm passes over a bag, low pressure air is injected into the filter bag opposite the normal direction of the airflow through the bag. The bag will expand and the dust cake will break away. This air will continue to pass through the bag in a reverse direction to further separate the dust cake from it.

Separated dust falls into the hopper where it is removed through an airlock or other airtight device. The airlock is placed at the discharge and allows the separated material to flow out while preventing air from entering. Air leakage at the hopper’s discharge will cause re-entrainment of dust onto the filter bags, which could contribute to high differential pressures.
Filter Media Properties

Filter media is manufactured from various materials, which provide different beneficial characteristics. Below is a Fabric Selection chart, which summarizes some of the properties of common fabric materials.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ACID RESISTANCE</th>
<th>ALKALI RESISTANCE</th>
<th>SOLVENT RESISTANCE</th>
<th>STRENGTH &amp; ABRASION</th>
<th>FLAME RESISTANCE</th>
<th>FILTRATION PROPERTIES</th>
<th>RELATIVE COST</th>
<th>OPERATING TEMP °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polypropylene</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>P</td>
<td>G</td>
<td>1</td>
<td>180</td>
</tr>
<tr>
<td>Acrylic</td>
<td>G</td>
<td>F</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>2</td>
<td>260</td>
</tr>
<tr>
<td>Polyester</td>
<td>G</td>
<td>G</td>
<td>E</td>
<td>G</td>
<td>E</td>
<td>V</td>
<td>1</td>
<td>275</td>
</tr>
<tr>
<td>Ryton</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>G</td>
<td>E</td>
<td>V</td>
<td>6</td>
<td>375</td>
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<tr>
<td>Nomex</td>
<td>F</td>
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<td>V</td>
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<td>E</td>
<td>E</td>
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<td>425</td>
</tr>
<tr>
<td>Teflon</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>F</td>
<td>V</td>
<td>8</td>
<td>450</td>
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<tr>
<td>Fiberglass</td>
<td>E</td>
<td>F</td>
<td>E</td>
<td>P</td>
<td>E</td>
<td>F</td>
<td>3</td>
<td>500</td>
</tr>
<tr>
<td>P-84</td>
<td>V</td>
<td>F</td>
<td>V</td>
<td>G</td>
<td>E</td>
<td>E</td>
<td>5</td>
<td>500</td>
</tr>
</tbody>
</table>

P = Poor, F = Fair, G = Good, V = Very good, E = Excellent

Polypropylene
This synthetic is available in both continuous filament and staple fiber form and is produced as either a felt or woven material. Its major limitation is its low maximum continuous operating temperature of 180°F (88°C). Oxidizing agents, copper, and related salts damage polypropylene. Its primary benefit is that it is non-hygroscopic (does not chemically react with water). It exhibits great resistance to static build-up and abrasion, and provides a slick surface for good dust cake release during bag cleaning. Polypropylene is widely used in the food, detergent, chemical processing, pharmaceutical, and tobacco industries.

Acrylic
These synthetic fibers offer good hydrolytic resistance over a limited temperature range, 260°F (127°C) continuous, 275°F (135°C) surge. The homopolymer versions, such as Draylon T® produced by Farbenfabiken Bayer AG, are normally recommended. Acrylic fibers are used in the manufacture of ferrous and nonferrous metals, carbon black, cement, lime, fertilizers, and following spray dryers in coal-fired burners. They are also used extensively in wet-filtration applications.

Polyester
Today, polyesters are among the most widely used fabrics for general applications below 275°F (135°C), their maximum continuous-use temperature. Their maximum surge temperature is about 300°F (149°C). Polyester fibers are produced in both filament and staple form and are available in both woven and felted fabrics. The primary damaging agents are water (hydrolysis) and concentrated sulfuric, nitric, and carboxic acids. They have good resistance to weak alkalies and fair resistance to strong alkalies at low temperatures. They have good resistance to most oxidizing agents and excellent resistance to most organic solvents.
Ryton
This is a relatively new synthetic fiber with a moderate temperature range, 375°F (190°C) continuous, 450°F, (232°C) surge. It will hydrolyze, but only at temperatures above 375°F. It has excellent resistance to both acids and alkalies, which makes it very useful in combustion-control applications. Its early applications have been on industrial coal-fired boilers, waste-to-energy incineration (with and without spray dryers), titanium dioxide, and installations where Nomex does not perform well due to chemical or hydrolytic attack.

Nomex
This is a commonly used fiber for applications in the 275-400°F (135-204°C) range. It is produced in both filament and staple fiber form and is available as both woven and felted fabrics. It has excellent thermal stability, shrinking less than 1% at 350°F (177°C). The fiber is flame resistant, but when impregnated with combustible dusts, will support combustion that will melt and destroy the fabric. Nomex will begin to hydrolyze at 375°F (190°C) when the relative humidity is 10% or greater. Hydrolysis changes the normal white or gray fabric to a red-brown color. The presence of acids will catalyze the hydrolysis process. Unacceptably short bag life will result where sulfur oxides (SOx) and moisture are present and frequent dew point excursions occur, such as in coal-fired boilers. Some acid-retardant finishes have been developed for Nomex, but have been found to improve bag life by no more than 50%, leaving most bag life cycles unacceptably short.

Teflon® (PTFE)
Teflon® is unique among synthetics in its ability to resist chemical attack across the entire pH range throughout its operating temperature range of 450°F (232°C) continuous, to 500°F (260°C) surge. This fluorocarbon fiber is non-adhesive, has zero moisture absorption, and is unaffected by mildew or ultraviolet light. The primary shortcomings of Teflon® are its high cost and relatively poor abrasion resistance. However, the higher cost can often be justified through longer bag life in extremely corrosive atmospheres. Felted Teflon® is also produced in combination with staple glass fibers and marketed by DuPont as Tefaire®. This combination produces some improved filtration and flow characteristics. Applications of Teflon® include coal-fired boilers, waste-to-energy incinerators, carbon black, titanium dioxide, primary and secondary smelting operations, and chemical processing.

Fiberglass
Most fiberglass fabrics are woven from minute 0.00015 inch (.0038 mm) filaments. Many variations of yarn construction, fabric weaves, and fabric finishes are available. It is also produced in a felted form. Fiberglass has the highest operating temperature range available in conventional fabrics: 500°F (260°C) continuous, 550°F (288°C) surge. Above 500°F (260°C), the fiberglass itself is not directly damaged, but the finish which provides yarn-to-yarn lubrication begins to vaporize, resulting in accelerated mechanical wear of the glass fibers. Fiberglass is noncombustible, has zero moisture absorption (cannot hydrolyze), has excellent dimensional stability, and has reasonably good strength characteristics. Woven glass fabrics have high tensile strength characteristics but relatively low flex strength, especially in the fill (circumference) direction of the bag, and low abrasion resistance. Care must be taken to minimize flexing and rubbing. Fiberglass fabrics have relatively good resistance to acids, but impurities in the glass fibers are attacked by hydrofluoric, concentrated sulfuric, and hot phosphoric acids. They also have poor resistance to hot solutions of weak alkalies, acid anhydrides, and metallic oxides. For these reasons, glass fabrics should not be operated below the acid dew point. Fiberglass fabrics are used extensively with coal-fired boilers and high temperature metals applications.

P-84
P-84 is an aromatic polymer fiber produced in felt form only. The unique shape of the fiber produces improved capture efficiency characteristics. This fabric is specified at 500°F. Composites are available that take advantage of the superior filtration characteristics of P-84 while reducing its cost. Any of the previous felted materials can be combined with P-84 to produce a fabric composite that exhibits the characteristics of both materials.
Media Treatments

Surface Treatment of Filtration Media
Various types of surface treatment are available to enhance the filter media performance. Discussion of these treatments and their benefits are beyond the scope of this manual. Please consult AIRLANCO at 800-500-9777 for further information on this subject.

Pre-coating Filter Media
Fine, moist, or adhesive dusts will contribute to premature blinding of filter media. Pre-coating of the filter media with a layer of an inert dust of known particle size distribution, such as calcium carbonate (CaCO₃), can minimize problems associated with these types of dusts. Consult AIRLANCO at 800-500-9777 for information and recommendations regarding the pre-coating of your filter bags.
Installation

Filter

AiRLANCO filters will be shipped either as complete units or in sections. All units require the installation of bags and cages along with electrical connections (460/230/60/3 AC) to the fan and cleaning arm drive. Larger filters are shipped in major subassemblies that are bolted together at the jobsite and set on the foundation. Refer to the general arrangement drawing for details on the number of subassemblies and the extent of assembly required for your unit.

Lubrication

Fan, motors, and bearings require periodic lubrication, depending on the operating conditions of the filter. Refer to the lubrication schedule in the maintenance section on page 12 of this manual. Gear motors are filled prior to shipping.

Bag and Cage Installation

1. Lower the bottom of the bag through the hole in the tubesheet.

2. Fold the snap band (bag top) to insert it into the tubesheet hole.

3. Fit the groove of the snap band to the edge of the tubesheet and allow the band to snap into place.

4. Slide the cage into the bag until it rests on the tubesheet.

5. Check the fit of the snap band. It should fit securely all around with no wrinkles in the snap band. The top of the bag should be above the tubesheet approximately 3/8”.

Optional Grounding Strip

If the bags are equipped with a grounding strip, fold the wire over the top of the bag and down its side prior to fitting in the tubesheet. The wire should be between the bag cuff and the tubesheet as shown in the illustration.
Pleated cartridge filters have a pliable polyurethane top flange that is inserted into the tubesheet hole and snapped into place as shown in the illustration above. To remove, push the filter element through the tubesheet hole and let it fall into the hopper. Retrieve dirty elements from the hopper access door.

**CAUTION**: Cartridges may hang up on vortex breakers in filter inlet during removal.
RLP/MP Cage installation to “back” side of support channels

On smaller RLP/MP filters it is difficult to get the cages to the back side of the reverse air fan support channels after the filter has been assembled. Before placing any bags or cages in any of the tubesheet holes, locate a tubesheet hole relatively below the front support channel. Angle the cage as shown below in first two figures down the tubesheet hole to get the cage between the front and back support channels.

Locate a second hole relatively below the back support channel. Angle the cage as shown above down the tubesheet hole to get the cage to the back side of the support channels. Stack all the cages on the back side until installation.

Next, install bags and cages under the support channels. Finally, install the rest of the bags on the back side and front side of the support channels working from the back to the front. See page 6 for instructions on installing bags and cages to the tube sheet.
WARNING
- Read these instructions carefully and completely before attempting to unpack, install or service the explosion vent.
- Handle the explosion vent with extreme care. DO NOT bend, poke, or in any way distort the explosion vent.
- Do not locate vent assembly where personnel are exposed to the vent or the area above or in front of the vent, as they may be injured by the release of pressure, flame, noise, particles, and/or process material.
- Locate the explosion vent so that the discharge does not ignite other combustibles, resulting in an ensuing fire or secondary explosion.
- Interfacing equipment and/or machinery must also be protected.
- Flow arrows on round explosion vent tags, or explosion vent tag for square and rectangular vents must be directed to the atmospheric side of the process. Provisions shall be made to prevent personnel from standing or walking on vents, as they risk falling through.
- The vent opening is to be left free and clear. Nothing, i.e. goods or products, is allowed to obstruct the vent area as this will decrease vent efficiency.
- Install the enclosed DANGER sign in a conspicuous location near the zone of potential danger.

GENERAL
An explosion vent is a pressure relief device, designed to give an instantaneous opening at a predetermined pressure. Its purpose is to protect the equipment from excessive pressures caused by dust or gas deflagrations.

INSPECTION/PREPARATION
WARNING: Always handle the explosion vent with extreme caution. Handle the explosion vent by its edges only. Damage to the functional area (center) or seat area of the explosion vent may adversely affect the performance of the explosion vent. Read the explosion vent tag completely before installing to confirm that the size and type are correct for your system.

1. Carefully remove the explosion vent from its packaging container.
2. Inspect the explosion vent for damage.
3. If foreign material is present, carefully clean the explosion vent with a solvent that is compatible with your media.
4. Two personnel are recommended for handling of all vents larger than 24" x 30" (600 x 1000 mm) (rectangular) and 30" (800 mm) (round) or larger.
5. CV-SF vents require vent frames with back-up bars to properly function (consult Fike for design requirements).

INSTALLATION - OPEN DISCHARGE
WARNING: The vent opening should be left free and clear. Do not insulate any part of the explosion vent or frame without consulting Fike.

IMPORTANT: When explosion vents are installed horizontally, the use of drainage/weep holes in the holddown frame is required.

1. Use base/inlet of explosion vent frame as a template to indicate placement of explosion vent on the vessel or duct to be protected.

2. Cut the vessel or duct opening to the marked size. The marked size should match the size identified on the vent tag.
3. Weld or bolt the inlet angle frame to the vessel or duct.

IMPORTANT: The explosion vent frame must be installed such that the seat area is flat and bolt holes remain perpendicular (square and rectangular vent frames) or circular (round vent frames).

4. If sealing is a particular concern due to the nature of the process, apply a process compatible silicone sealant or gasket to provide seal between explosion vent and inlet frame.
5. If using a gasket, select a gasket material that is compatible with the process, with a suggested thickness of 1/8" (3.2 mm) maximum. The gasket is to have the same inside diameter and outside diameter as the explosion vent frame.
6. Install the explosion vent and outlet flange aligning the bolt holes. DO NOT force the explosion vent hole alignment.
7. Apply light oil to the threads and install the nuts and bolts hand tight.
8. Torque each bolt to the value identified on the explosion vent tag.

CAUTION: The torque values should not be exceeded as this may cause failure of the bolt and/or damage to the vent.

INSTALLATION – WITH FLAMQUENCH II SQ (FQIISQ)
For additional information, refer to FQIISQ installation instructions, E06-085.

WARNING: The vent opening should be left free and clear. Do not insulate any part of the explosion vent or frame without consulting Fike.

1. Use base/inlet of explosion vent frame as a template to indicate placement of explosion vent on the vessel or duct to be protected.
2. Cut the vessel or duct opening to the marked size. The marked size should match the size identified on the vent tag.

**IMPORTANT:** The FQIISQ uses an alignment hole feature to ensure proper orientation of the hinge of the explosion vent. The alignment hole must be included on the mounting frame so the explosion vent and FQIISQ can be mounted in only the prescribed orientation. Consult factory for FQIISQ bolting pattern.

3. Weld or bolt the inlet angle frame to the vessel or duct.

**IMPORTANT:** The explosion vent frame must be installed such that the seat area is flat and bolt holes remain perpendicular (square and rectangular vent frames).

4. Install gaskets on both sides of the explosion vent. Select a gasket material that is compatible with the process, with a suggested thickness of 1/16" (1.5 mm) maximum. The gasket is to have the same inside diameter and outside diameter as the explosion vent frame.

5. Install the explosion vent and outlet flange aligning the bolt holes. DO NOT force the explosion vent hole alignment.

6. Apply light oil to the threads and install the nuts and bolts hand tight.

7. Torque each bolt to the value identified on the explosion vent tag.

**CAUTION:** The torque values should not be exceeded as this may cause failure of the bolt and/or damage to the vent.

**BURST INDICATOR**
The explosion vents can have as an option an integrated electric burst indicator designed for intrinsically safe service. Refer to Burst Indicator Instructions / Drawing for electrical and dimensional specifications.

**CAUTION:** Unacceptably high voltage or currents will permanently damage the electrical system and the use of a non approved intrinsically safe power supply may even be the eventual ignition source of a dust or gas explosion. All burst indicators must be installed in an intrinsically safe circuit which conforms to the applicable national standard.

**WARNING:** Do not bend the electrical cable at any angle at a distance of less than 8 inch (20cm) from the mechanical bracing part and do not lift the explosion vent by the electrical cable, as this may damage the electrical circuit.

**WARNING:** The maximum torque values as mentioned on the nameplate must not be exceeded as this will permanently damage the electrical circuit.

**MAINTENANCE**
The explosion vent is maintenance-free due to its basic design and concept. Periodic visual inspections should be performed in accordance to the operating parameters and severity of service. All operational system parameters should be observed as a standard maintenance practice. The explosion vent must be replaced if they appear damaged, corroded, or leaking.

**NOTE:** Severe service is defined as rapid changes in pressure, high pressure, high temperature, or corrosive process.
Operation

Proper startup and shutdown procedures are very important in the successful operation of a bag house filter. A typical ambient air dust collection system should follow this sequence of operation.

1. Start the dust removal system that transfers collected material from the filter hopper. This could include rotary airlocks, pneumatic conveying equipment, etc. This step is not applicable for Style II bin vent filters.

2. Start the bag house cleaning mechanism. Before starting additional equipment, let the cleaning mechanism run long enough to allow the filter temperature and humidity to stabilize with ambient conditions and to remove any material that may have been left from the previous day’s operation. This is most important in high humidity climates.

3. Start the main system fan.

4. Start the operation or process where dust is being collected.

Reverse the order of the above sequence to shut down the bag house.

1. Shut down the operation or process where dust is being collected.

2. Shut down the main system fan.

3. Shut down the bag house cleaning mechanism after allowing the collected material to be discharged from the collector.

4. Shut down the dust removal system that transfers material from the filter hopper (not applicable for Style II bin vent filters).
Maintenance

Very little maintenance is required to achieve maximum efficiency and life from your AIRLANCO filter.

The following items should be periodically serviced:

Lubrication
All bearings in the cleaning mechanism and fan drive should be lubricated periodically on a schedule that corresponds with other equipment in your facility. Bearings should be filled with quality grease at least once a year. Avoid forcing an excessive amount of grease into the bearing as this may cause seal damage. The roller chain drive should be kept tight enough so that the chain cannot “climb the sprocket” and should be oiled lightly once a month.

Cleaning and Repair
The external portion of this unit should be treated as any other metal surface that is subject to corrosion. Clean periodically and repaint damaged surfaces when needed to prevent corrosion.

Dust may enter the clean air plenum through a leaking or broken bag. Remove accumulated dust from clean air plenum immediately. Dust in the clean air side of a filter bag will reduce the life and performance of the bag.

Bags
Filter bags do not require any periodic maintenance. However, at some point the bags will require replacement. This will be indicated by persistent high differential pressure across the bags and is not accompanied by any other change in the operating parameters of the system. Many factors affect the life of filter bags. Refer to the section on troubleshooting (page 18) if low bag life or persistent wear problems are evident.

Rotary Valve (Airlock) See airlock operation and maintenance manual.

Screw Conveyor
The roller chain drive should be kept tight enough so that the chain cannot "climb the sprocket" and should be oiled lightly once per month. The auger bearings have been factory pre-lubricated with high quality grease and for normal conditions of service require no further lubrication. Periodic lubrication may be advisable when service is abnormal with respect to speed, temperature, exposure to moisture, dirt, or corrosive chemicals, or where extremely long life is required. Remove pipe plug and replace with a standard grease fitting to lubricate.

Speed Reducer (Arm Drive)
For maintenance and lubrication requirements, refer to the included Ohio Gear Ironman manual.
The Magnehelic® gauge is used to measure the differential pressure between the clean gas side (top plenum) and the dirty gas side of the baghouse. It measures the force required to pass air through the filter media.

Normal pressure drop for a filter will fall in the range of 1 to 5 inches of water after the elements establish a dust cake. The differential pressure reading will increase as the elements get dirty. Eventually, the dust cake must be removed from the filter element surface or air flow will fall to unacceptable levels.
The RLP is a continuous self-cleaning filter. A flow of low pressure air from a centrifugal fan is directed into each bag at periodic intervals. Air is distributed to each row of filter bags through a rotating arm equipped with nozzles. Refer to drawing 10532 on page 19 for an illustration of the cleaning mechanism. The low pressure reverse flow of air from the fan will gently clean each bag. A percentage of the dust cake will fall away from the bag into the filter hopper. It is normal for some of the dust to re-entrain onto the bag. The rotating distribution arm turns at approximately 1 RPM. The slow speed virtually eliminates wear to moving parts and seals. A ¾ HP gearmotor turns the arm with a chain drive.

Troubleshooting the RLP is a straight forward process, but does require some preliminary information to simplify the process. Complete the worksheet on the following page before calling AIRLANCO (800-500-9777) for service.
RLP Troubleshooting Worksheet

Customer Name___________________________________________________________

Location__________________________________________________________________

Contact Name_____________________________________________________________

Phone__________________ Cell Phone__________________ Fax___________________

Email Address_____________________________________________________________

Filter Model __________________________ Serial # ______________________________

☐ How long has the filter been in service?_________________________________

☐ When did the problem start?_______________________________________________

☐ Please provide a complete description of the problem and a detailed description of the system layout.____________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

☐ Are the airlock and discharge auger operating, and in the correct rotation?

☐ Is the reverse (cleaning) air arm rotating?

☐ Is the reverse (cleaning) air fan running?

☐ Is the fan operating with the correct rotation (clockwise from the motor side)?

☐ Verify the fan motor nameplate data. This motor must be 3600 RPM to deliver correct air flow.

☐ Are any bags and/or blank-out plugs missing?

☐ Look for leaks between the tubesheet sections on panelized RLPs.
**Problem: High differential pressure across tubesheet**  
*(Possible causes with solutions)*

**Bad Gauge**
Check the gauge by blowing into it. Do not use compressed air, which could damage the gauge. Replace the gauge if the needle does not move.

**Leaking Gauge Lines**
Check the full length of both lines for cracks, splits, or breaks. Replace both lines with new tubing. Copper tubing may be recommended if the environment is harsh. Clogged gauge lines will give the same result. Check the small filter located on the inside of the baghouse just below the tubesheet. Clean or replace it as necessary.

**Cleaning Arm is not rotating**
Inspect the arm drive components. The drive chain should be supple, well lubricated, and properly tensioned. Check the gearmotor for operation and lubrication. Check the bearings on the arm shaft, which are located at the tubesheet and at the top side of the support channels.

**Cleaning Fan malfunction**
Check that the fan is running and with the correct wheel rotation, CW from the motor side. Check the motor nameplate to verify that the motor is operating at 3450 RPM. Check the RPM with a tachometer if there is any doubt.

**Media Blinding**
Excessive moisture is the most common cause of blinding. High humidity, condensation, and leaks in the duct are typical sources. In high humidity areas, the filter should be operated under no load until air temperatures stabilize. The air stream temperature crossing the dew point, either from ambient high humidity or from process moisture, causes condensation. It may be necessary to pre-heat and insulate the filter to avoid dew point issues. Duct leaks are found by inspection and preventative maintenance.

**Interstitial or “Can” Velocity too high**
Check the system airflow with the original design values. Static pressure may have been reduced if the fan speed has been increased, the duct layout modified, or other changes have been made in the system. Any increase in CFM will increase interstitial velocity and tend to “float” dust in the filter. A change in the process could result in smaller particle sizes in the dust, which would have the same effect as increased CFM. In either case, it may be necessary to install a larger filter or reduce airflow to original design.

**Bag Fit on Cages**
Check the bag fit on cages with a pinch test. You should be able to pinch at least ½” of fabric at any position. Bags that are too tight will not allow the bag to “pop”, knocking the dust cake loose when cleaned. Replace the bags if they are too tight.

**Rotary Valve (Airlock) Leakage**
Air leakage through a worn out valve rotor into the filter hopper will re-entrain dust onto the filter bags. Air leakage will also keep the collected dust from properly feeding out of the hopper, potentially plugging the filter. Replace the airlock.

**High Dust Load**
Filters can handle very high dust loads under normal conditions when properly sized. Has something changed in the process, to either increase material flow or to decrease particle size? Compare current operating conditions to the original design. It may be necessary to install a larger filter or reduce airflow to original design.
Problem: Low differential pressure across tubesheet

Bad Gauge
Check the gauge by blowing into it. Do not use compressed air, which could damage the gauge. Replace the gauge if the needle does not move.

Leaking Gauge Lines
Check the full length of both lines for cracks, splits, or breaks. Replace both lines with new tubing. Copper tubing may be recommended if the environment is harsh. Clogged gauge lines will give the same result. Check the small filter located on the inside of the baghouse just below the tubesheet. Clean or replace it as necessary.

Holes in Bags
Replace all bags. See section on poor bag life on pg. 18.

System Air Volume too low
Check the duct system for plugs and closed blast gates. Check the main system fan for correct RPM or a closed damper.

Bag & Cage Installation
Look for dust in the clean air plenum or discharging from the system fan. Bags may be missing or may not be properly installed in the tubesheet. Refer to pg. 6 for correct installation.

Blank-Out Plugs
Plugs may be missing or improperly installed.

Problem: Dust in exhaust air

Start Up Period
Allow the filter to run for 48 to 96 hours to establish a dust cake. Some applications will require “seeding” or pre-coating the bags with an appropriate material to establish a cake.

Holes in Bags
Replace all bags. See section on poor bag life on pg. 18.

Bag & Cage Installation
Look for dust in the clean air plenum or discharging from the system fan. Bags may be missing or may not be properly installed in the tubesheet. Refer to pg. 6 for correct installation.

Blank-Out Plugs
Plugs may be missing or improperly installed.

Leaks
Look carefully for gaps or uncaulked areas between the tubesheet sections on large panelized RLP filters.
Problem: Poor Bag Life

*Abrasions*  
Provide an inlet transition to make use of the full inlet area. Stubbing a duct onto a plate on the inlet will result in high velocity. Do not mount a duct elbow directly on the filter inlet, as this will cause eccentric loading and potentially damaging airflows.

*Damaged Cages*  
Filter cages that are bent, have broken wires, or have corrosion will cause premature failure of the filter bags. Inspect and replace as soon as possible. Corrosion problems may require coated or stainless steel cages.

*High Air Volumes*  
High air-to-cloth ratios can shorten filter bag life. Compare current operating conditions to the original design.

*Media Blinding*  
Excessive moisture is the most common cause of blinding. High humidity, condensation, and leaks in the duct are typical sources. In high humidity areas, the filter should be operated under no load until air temperatures stabilize. The air stream temperature crossing the dew point, either from ambient high humidity or from process moisture, causes condensation. It may be necessary to preheat and insulate the filter to avoid dew point issues. Duct leaks are found by inspection and preventative maintenance.

*Incorrect Filter Media*  
High temperatures, chemical content, and dust composition will affect filter media life. Consult AIRLANCO (800-500-9777) for alternative media selections.

Problem: Hopper Plugging

*Cleaning Arm is not rotating*  
Inspect the arm drive components. The drive chain should be supple, well lubricated, and properly tensioned. Check the gearmotor for operation and lubrication. Check the bearings on the arm shaft, located at the tubesheet and at the top side of the support channels.

*Cleaning Fan malfunction*  
Check that the fan is running and with the correct wheel rotation, CW from the motor side. Check the motor nameplate to verify that the motor is operating at 3450 RPM. Check the RPM with a tachometer if there is any doubt.

*Rotary Valve (Airlock) Leakage*  
Air leakage through a worn out valve rotor into the filter hopper will re-entrain dust onto the filter bags. Air leakage will also keep the collected dust from properly feeding out of the hopper, potentially plugging the filter. Replace the airlock.

*Airlock/Auger Speed*  
If your filter is equipped with an auger/airlock combination slave drive and operating conditions have changed, the airlock/auger speed may need to be increased.

The above is intended as a quick reference for common problems that may be encountered with a RLP dust filter. If you are experiencing any difficulties that are not covered here or have any questions concerning your AIRLANCO filter, fill out the Troubleshooting Worksheet on page 15, then contact AIRLANCO at www.airlanco.com or at 800-500-9777.
SECTION A - A

ASSEMBLY NOTES:
1. FAN SUPPORT CHANNELS & ROTARY ARM ASSEMBLY ARE LEVEL & PARALLEL TO TUBESHEET AS SHOWN. SEE DIMENSION TO BOTTOM OF ROTARY ARM & BOTTOM OF NOZZLES.
2. ROTATING ELBOW W/ SHAFT AND FAN SUPPORT CHANNELS ARE ASSEMBLED KEEPING THE UPPER & LOWER BEARINGS CONCENTRIC TO KEEP THE SHAFT 90° TO THE TUBESHEET.
3. 1/2" DIMENSION SHOWN IN "SEAL DETAIL" MAY VARY TO KEEP THE 8-1/2" & 3-5/16" DIMENSION FOR THE ROTATING ARM, BUT IS NOMINAL ALL AROUND THIS SEAL.
Worm Gear Reducers
Installation, Lubrication
and Maintenance Instructions

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Selection Information

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.

Written authorization from GROVE GEAR / ELECTRA-GEAR is required to operate or use reducers in man lift or people moving devices.

Check to make certain application does not exceed the allowable load capacities published in the current catalog.

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.

Safety Alert

**WARNING**

• For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.

• Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.

• Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.

• Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. Reducers should not be used as a brake.

• Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.

• Lifting supports including eyebolts are to be used for vertically lifting the gearbox only, with no other associated attachments or motors.

• Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.

• Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.

**CAUTION**

• Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.

• If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.

• Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Important Information

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

*The manufacturer makes no warranties or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.*

Resellers/Buyers agree to also include this entire document including the warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This instructions manual should be read together with all other printed information such as catalogs, supplied by Grove Gear / Electra-Gear.
General Operation

1. Run the motor which drives the reducer and check the direction of reducer output rotation. Consult motor nameplate for instructions to reverse the direction of rotation.

2. Attaching the load: On direct coupled installations, check shaft and coupling alignment between speed reducer and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.

3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the speed reducer output shaft or the driven mechanism.

   The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

Installation

1. Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting hole. Shim as required under flange or base feet which do not lie flat against the mounting surface.

   For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown on page 5. On double reduction units both the primary and the secondary must be vented. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the Factory for level and vent recommendations on non-standard mounting positions. Grove Gear WASHGUARD® / Electra-Gear Platinum units include ventless sealing technology (enviroseal) pre-installed at the factory. It is not necessary to vent these units, and they can be used as supplied from the factory. Do not loosen the nut holding the stem of the enviroseal, and do not block the hole in the stem. Do not blow pressurized air into the hole, and avoid spraying washdown chemicals directly into the hole.

2. Connect motor to speed reducer.

   Depending upon gear geometry and operating conditions worm gear reducers may or may not backdrive. Use of a brake or external holding device is required if any evidence of backdriving is not desired.

   Special consideration should be given to high inertia loads connected to the output shaft. Consult the factory for further details.

   DO NOT CHANGE MOUNTING POSITIONS WITHOUT CONTACTING FACTORY.

   Altering the mounting position may require special lubrication provisions which must be factory installed.

   Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result.

   A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. (e.g., sprockets, pulleys, couplings)

   For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

Lubrication - Standard Units

All standard reducers ordered from Factory are filled with Mobil Glygoyle 460 polyglycol (PAG) lubricant or equivalent suitable for continuous option within a -10° F to 120° F ambient temperature range. Double and triple reduction units have separate oil sumps and must be filled/checked independently. Prior to startup, verify that the oil is at the level shown on page 6. Lubricant type is stamped on all nameplates.

Change Intervals: Standard compounded lubricants (non-synthetic) should be changed every six months or 2500 operating hours, whichever comes first. Factory installed synthetic lubricants should be changed only when performing maintenance that requires gearbox disassembly.

Oil should be changed more often if reducer is used in a severe environment (i.e. dusty, humid).

In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied PAG oil is acceptable for incidental food contact (NSF H1) for use in and around food processing areas.

Do not mix different oils in the reducer. Grove Gear / Electra-Gear reducers are shipped standard with PAG lubricant – this lubricant is not compatible with conventional mineral or PAO synthetic oils.
The precision-made gears and bearings in Grove Gear / Electra-Gear Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. All standard reducers ordered from the factory are filled with ISO viscosity grade 460 polyglycol (PAG) lubricant. If oil needs to be added or changed, ONLY compatible polyglycol lubricants should be used. Contact the factory for more information.

Units shipped from Factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. Factory assumed mounting orientations are given below. If a size 818 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

The precision-made gears and bearings in Grove Gear / Electra-Gear Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. All standard reducers ordered from the factory are filled with ISO viscosity grade 460 polyglycol (PAG) lubricant. If oil needs to be added or changed, ONLY compatible polyglycol lubricants should be used. Contact the factory for more information.

### Special Lubrication Requirements - Size 818 and Larger

Units shipped from Factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. Factory assumed mounting orientations are given below. If a size 818 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

<table>
<thead>
<tr>
<th>Factory Assumed Mounting Orientation</th>
<th>Applicable Unit Styles*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worm Over</td>
<td>B, T, F, H, FH, C, D, DT, DF, DH, DFH, DX, DXT, DXH, DXFH, TT</td>
</tr>
<tr>
<td></td>
<td>Single Reduction</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Worm-Worm</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Helical-Worm</td>
</tr>
<tr>
<td></td>
<td>Triple Reduction Worm-Worm</td>
</tr>
<tr>
<td>Worm Under</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>Single Reduction</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Worm-Worm</td>
</tr>
<tr>
<td>Vertical Output</td>
<td>VL/VH, FE</td>
</tr>
<tr>
<td></td>
<td>Single Reduction</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Worm-Worm</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Helical-Worm</td>
</tr>
<tr>
<td>Vertical Input</td>
<td>J</td>
</tr>
<tr>
<td></td>
<td>Single Reduction</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Worm-Worm</td>
</tr>
<tr>
<td></td>
<td>Double Reduction Helical-Worm</td>
</tr>
</tbody>
</table>

* Includes “M” and “MQ” versions of all styles listed

### Oil Capacities (ounces) - Standard Units

<table>
<thead>
<tr>
<th>Mounting Position</th>
<th>UNIT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>813 815 818 821 824 826 830 832 842 852 860 870* 880* 8100*</td>
</tr>
<tr>
<td>1-Worm Over</td>
<td>4 12 12 20 24 40 56 72 112 188 312 560 768 1152</td>
</tr>
<tr>
<td>2-Worm Under</td>
<td>8 16 20 28 40 60 84 108 152 304 484 524 820 1280</td>
</tr>
<tr>
<td>3-Vertical Output</td>
<td>4 16 16 28 32 48 68 88 128 248 320 332 460 640</td>
</tr>
<tr>
<td>4-Vertical Input</td>
<td>4 16 16 24 32 48 72 92 128 248 325 328 584 800 1200</td>
</tr>
<tr>
<td>5-Extended Bearing</td>
<td>N/A N/A N/A N/A N/A N/A N/A N/A 8 12 17 27 640 1008 1632</td>
</tr>
<tr>
<td>5-Worm Over on Secondary Unit of Double Reduction</td>
<td>— — — N/A N/A N/A N/A N/A 192 308 320 485 805 1144 1716</td>
</tr>
</tbody>
</table>

* Shipped Dry

16 oz. = 1 pint  
2 pints = 1 quart  
4 quarts = 1 gallon  
1 gallon = 128 oz. = 231 cu. in.

**CAUTION** Always check for proper oil level after filling. Capacities vary somewhat with model and mounting position. Oil should rise to bottom edge of level hole. Do not overfill.

**CAUTION** Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result.
Standard Gear Reducer Mounting Positions
& Vent Plug, Level and Drain Locations

Maintenance - Standard Units

Your Grove Gear / Electra-Gear reducer has been tested and adjusted at Factory. Dismantling or replacement of components must be done by Grove Gear / Electra-Gear to maintain the warranty.

1. Frequently check the oil level of the reducer. If oil level is low, (refer to reducer vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.
2. Inspect vent plug often to insure it is clean and operating.
3. Always check for proper oil level after filling. Do not overfill or underfill with oil, or injury to personnel, reducer, or other equipment may result.
4. Do not mix different oils in the reducer.

Seals: The Grove Gear / Electra-Gear line of speed reducers utilizes premium quality seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can be easily accomplished by following the steps below:

1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Install a #10 sheet metal screw into the hole and pry out the seal.
2. Clean the seal bore of sealant.
3. Before installing the new seal, use electrical tape to cover any keyways on the shaft to prevent seal lip damage.
4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

Lubrication - Grove Gear WASHGUARD® / Electra-Gear Platinum

All Grove Gear WASHGUARD® / Electra-Gear Platinum reducers are shipped from Factory filled with Mobil Glygoyle 460 polyglycol (PAG) lubricant or equivalent suitable for continuous operation within a -10° F to 120° F ambient environment. If ambient temperature will be outside the above range, or if operation will be intermittent at temperatures below 20° F, consult Factory for lubrication recommendations. The unit is factory filled with the correct amount of oil for most mounting positions. If the unit will operate at input speeds below 900 RPM, or if a size 830 or larger unit is to operate with one of its shafts in a vertical position, consult Factory for special lubrication considerations.

In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied PAG oil is acceptable for incidental food contact (NSF H1) for use in and around food processing areas.

Do not mix different oils in the reducer. Grove Gear WASHGUARD® / Electra-Gear Platinum reducers are shipped standard with PAG lubricant – this lubricant is not compatible with conventional mineral or PAO synthetic oils.
Maintenance – Grove Gear WASHGUARD® / Electra-Gear Platinum

Your Grove Gear WASHGUARD® / Electra-Gear Platinum reducer has been tested and adjusted at Factory. Dismantling or replacement of components must be done by Grove Gear / Electra-Gear to maintain the warranty.

Inspect the stem of the internal Enviro-Seal often to ensure it is clean and operating properly. Do not remove nut holding the stem of the Enviro-Seal to the housing.

Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The Grove Gear WASHGUARD® / Electra-Gear Platinum line of gear reducers utilize premium quality seals which are state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can easily be accomplished by following the procedure given under Maintenance - Standard Units from page 6. If seal leakage has resulted in the loss of a significant amount of oil, it may be necessary to add more lubricant. For all Grove Gear WASHGUARD® / Electra-Gear Platinum worm drives, fill the gearbox to the level indicated in the diagram below.

<table>
<thead>
<tr>
<th>Grove Gear WASHGUARD® / Electra-Gear Platinum Oil Fill (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solid Output Shaft</strong></td>
</tr>
<tr>
<td>Grove Gear WASHGUARD® / Electra-Gear Platinum Oil Fill (ounces)</td>
</tr>
<tr>
<td><strong>Hollow Output Shaft</strong></td>
</tr>
<tr>
<td>Grove Gear WASHGUARD® / Electra-Gear Platinum Oil Fill (ounces)</td>
</tr>
</tbody>
</table>

Class of Service

Load conditions must be within cataloged ratings published in the current Grove Gear / Electra-Gear Catalog (available upon request). Published ratings assume lubrication with ISO 460 viscosity grade polyglycol (PAG) oil. Contact Factory for ratings when an alternate lubricant is used.

Warranty From Grove Gear / Electra-Gear - See 8050 catalog for warranty terms and conditions.
## MODEL B813-8100
(Basic Unit Components)

### SINGLE REDUCTION

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HOUSING</td>
</tr>
<tr>
<td>2</td>
<td>PIPE PLUG</td>
</tr>
<tr>
<td>3</td>
<td>VENT PLUG</td>
</tr>
<tr>
<td>4</td>
<td>SPLASH GUARD</td>
</tr>
<tr>
<td>5</td>
<td>INPUT CAP</td>
</tr>
<tr>
<td>6</td>
<td>O-RING</td>
</tr>
<tr>
<td>7</td>
<td>HEX HEAD CAP SCREW</td>
</tr>
<tr>
<td>8</td>
<td>INPUT OIL SEAL</td>
</tr>
<tr>
<td>9</td>
<td>INPUT BEARING (cup and cone for 842 and larger units)</td>
</tr>
<tr>
<td>10</td>
<td>INPUT BEARING (cup and cone for 842 and larger units) *</td>
</tr>
<tr>
<td>11</td>
<td>RETAINING SCREW</td>
</tr>
<tr>
<td>12</td>
<td>INPUT WORM SHAFT</td>
</tr>
<tr>
<td>13</td>
<td>OUTPUT COVER - OPEN</td>
</tr>
<tr>
<td>14</td>
<td>OUTPUT COVER - CLOSED</td>
</tr>
<tr>
<td>15</td>
<td>O-RING</td>
</tr>
<tr>
<td>16</td>
<td>OUTPUT COVER SHIM (as required)</td>
</tr>
<tr>
<td>17</td>
<td>OUTPUT OIL SEAL</td>
</tr>
<tr>
<td>18</td>
<td>OUTPUT BEARING (18A, CONE, 18B, CUP)</td>
</tr>
<tr>
<td>19</td>
<td>HEX HEAD CAP SCREW</td>
</tr>
</tbody>
</table>

### BASIC SINGLE REDUCTION UNIT (B-STYLE)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>OUTPUT SHAFT - SINGLE</td>
</tr>
<tr>
<td>21</td>
<td>OUTPUT SHAFT - DOUBLE</td>
</tr>
<tr>
<td>22</td>
<td>GEAR SPACER</td>
</tr>
<tr>
<td>23</td>
<td>GEAR KEY (only used on size 826 and larger units)</td>
</tr>
<tr>
<td>24</td>
<td>OUTPUT GEAR</td>
</tr>
<tr>
<td>25</td>
<td>INPUT COVER</td>
</tr>
<tr>
<td>26</td>
<td>KEY - OUTPUT EXTENSION</td>
</tr>
<tr>
<td>27</td>
<td>KEY - INPUT EXTENSION</td>
</tr>
<tr>
<td>28</td>
<td>NAMEPLATE</td>
</tr>
</tbody>
</table>

### QUILL MOTOR FLANGE UNIT (BMQ-STYLE)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>QUILL MOTOR FLANGE</td>
</tr>
<tr>
<td>41</td>
<td>INPUT OIL SEAL</td>
</tr>
<tr>
<td>42</td>
<td>HEX HEAD CAP SCREW (flange to housing)</td>
</tr>
<tr>
<td>43</td>
<td>RETAINING RING - SHAFT</td>
</tr>
<tr>
<td>44</td>
<td>RETAINING RING - HOUSING</td>
</tr>
<tr>
<td>45</td>
<td>QUILL INPUT SHAFT</td>
</tr>
<tr>
<td>46</td>
<td>KEY - INPUT</td>
</tr>
<tr>
<td>47</td>
<td>HEX HEAD CAP SCREW (motor to flange)</td>
</tr>
</tbody>
</table>

### HOLLOW OUTPUT SHAFT UNIT (H-STYLE)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>OUTPUT COVER</td>
</tr>
<tr>
<td>52</td>
<td>OUTPUT OIL SEAL</td>
</tr>
<tr>
<td>53</td>
<td>OUTPUT BEARING (53A, CONE, 53B, CUP)</td>
</tr>
<tr>
<td>54</td>
<td>GEAR SPACER</td>
</tr>
<tr>
<td>55</td>
<td>OUTPUT SHAFT</td>
</tr>
<tr>
<td>56</td>
<td>SETSCREW</td>
</tr>
<tr>
<td>57</td>
<td>GEAR KEY (only used on size 826 and larger units)</td>
</tr>
<tr>
<td>58</td>
<td>OUTPUT GEAR</td>
</tr>
<tr>
<td>59</td>
<td>OUTPUT KEY</td>
</tr>
</tbody>
</table>

### LONG MOTOR FLANGE AND COUPLING KIT (BM-STYLE)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>&quot;C&quot; FACE MOTOR FLANGE</td>
</tr>
<tr>
<td>111</td>
<td>HEX HEAD CAP SCREW (flange to housing)</td>
</tr>
<tr>
<td>112</td>
<td>COUPLING KEY - REDUCER SHAFT</td>
</tr>
<tr>
<td>113</td>
<td>SETSCREW - REDUCER SHAFT</td>
</tr>
<tr>
<td>114</td>
<td>COUPLING GEAR - REDUCER SHAFT</td>
</tr>
<tr>
<td>115</td>
<td>COUPLING SLEEVE</td>
</tr>
<tr>
<td>116</td>
<td>SETSCREW - MOTOR SHAFT</td>
</tr>
<tr>
<td>117</td>
<td>COUPLING GEAR - MOTOR SHAFT</td>
</tr>
<tr>
<td>118</td>
<td>COUPLING KEY - MOTOR SHAFT</td>
</tr>
<tr>
<td>119</td>
<td>HEX HEAD CAP SCREW</td>
</tr>
</tbody>
</table>

### VERTICAL SHAFT REQUIRED PARTS

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>PLASTIC PLUG</td>
</tr>
<tr>
<td>129</td>
<td>OUTPUT COVER - CLOSED</td>
</tr>
<tr>
<td>130</td>
<td>OUTPUT COVER - OPEN</td>
</tr>
<tr>
<td>131</td>
<td>OUTPUT BEARING GREASE RETAINER</td>
</tr>
<tr>
<td>132</td>
<td>GREASE FITTING</td>
</tr>
<tr>
<td>133</td>
<td>SEALED BALL BEARING (only used on size 818 thru 826 units)</td>
</tr>
<tr>
<td>134</td>
<td>INPUT COVER</td>
</tr>
<tr>
<td>135</td>
<td>INPUT BEARING GREASE RETAINER</td>
</tr>
</tbody>
</table>

*ONLY USED ON SIZE 842 AND LARGER UNITS
*ONLY USED ON SIZE 830 AND LARGER UNITS
^ SUPPLIED ONLY AS OUTPUT ASSEMBLY ON 813 THROUGH 824 UNITS
PARTS LIST

MODEL BM813-8100
(Refer to Single Reduction Basic Unit Components)

MODEL BMQ813-8100
(Refer to Single Reduction Basic Unit Components)

HOLLOW SHAFT MODELS
H, HM, HMQ
(Refer to Single Reduction Basic Unit Components)
# PARTS LIST

## MODEL D813-8100
(Basic Unit Components)

### DOUBLE REDUCTION UNIT (D-STYLE)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HOUSING</td>
</tr>
<tr>
<td>2</td>
<td>PIPE PLUG</td>
</tr>
<tr>
<td>3</td>
<td>VENT PLUG</td>
</tr>
<tr>
<td>4</td>
<td>SPLASH GUARD</td>
</tr>
<tr>
<td>5</td>
<td>INPUT CAP</td>
</tr>
<tr>
<td>6</td>
<td>O-RING</td>
</tr>
<tr>
<td>7</td>
<td>HEX HEAD CAP SCREW</td>
</tr>
<tr>
<td>8</td>
<td>INPUT OIL SEAL</td>
</tr>
<tr>
<td>9</td>
<td>INPUT BEARING (cup and cone for 842 and larger units)</td>
</tr>
<tr>
<td>10</td>
<td>INPUT BEARING (cup and cone for 842 and larger units)</td>
</tr>
<tr>
<td>11</td>
<td>RETAINING SCREW</td>
</tr>
<tr>
<td>12</td>
<td>INPUT WORM SHAFT</td>
</tr>
<tr>
<td>13</td>
<td>OUTPUT COVER - OPEN</td>
</tr>
<tr>
<td>14</td>
<td>OUTPUT COVER - CLOSED</td>
</tr>
<tr>
<td>15</td>
<td>O-RING</td>
</tr>
<tr>
<td>16</td>
<td>OUTPUT COVER SHIM (as required)</td>
</tr>
<tr>
<td>17</td>
<td>OUTPUT OIL SEAL</td>
</tr>
<tr>
<td>18</td>
<td>OUTPUT BEARING (18A. CONE, 18B. CUP)</td>
</tr>
<tr>
<td>19</td>
<td>HEX HEAD CAP SCREW</td>
</tr>
<tr>
<td>↓ 20</td>
<td>OUTPUT SHAFT - SINGLE</td>
</tr>
<tr>
<td>↓ 21</td>
<td>OUTPUT SHAFT - DOUBLE</td>
</tr>
<tr>
<td>22</td>
<td>GEAR SPACER</td>
</tr>
<tr>
<td>23</td>
<td>GEAR KEY (only used on size 826 and larger units)</td>
</tr>
<tr>
<td>24</td>
<td>OUTPUT GEAR</td>
</tr>
<tr>
<td>25</td>
<td>KEY - OUTPUT EXTENSION</td>
</tr>
<tr>
<td>26</td>
<td>KEY - INPUT EXTENSION</td>
</tr>
<tr>
<td>27</td>
<td>NAMEPLATE</td>
</tr>
<tr>
<td>28</td>
<td>INPUT OIL SEAL</td>
</tr>
<tr>
<td>29</td>
<td>RETAINING RING - SHAFT</td>
</tr>
<tr>
<td>30</td>
<td>QUILL INPUT SHAFT</td>
</tr>
<tr>
<td>31</td>
<td>DOUBLE REDUCTION ADAPTER</td>
</tr>
<tr>
<td>32</td>
<td>PRIMARY SOLID OUTPUT KEY</td>
</tr>
<tr>
<td>33</td>
<td>EXPANSION PLUG</td>
</tr>
<tr>
<td>34</td>
<td>PRIMARY SOLID OUTPUT SHAFT</td>
</tr>
</tbody>
</table>

**QUILL MOTOR FLANGE UNIT (DMO-STYLE)**

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>40</td>
<td>QUILL MOTOR FLANGE</td>
</tr>
<tr>
<td>41</td>
<td>INPUT OIL SEAL</td>
</tr>
<tr>
<td>42</td>
<td>HEX HEAD CAP SCREW (flange to housing)</td>
</tr>
<tr>
<td>43</td>
<td>RETAINING RING - SHAFT</td>
</tr>
<tr>
<td>44</td>
<td>RETAINING RING - HOUSING</td>
</tr>
<tr>
<td>45</td>
<td>QUILL INPUT SHAFT</td>
</tr>
</tbody>
</table>

**HOLLOW OUTPUT SHAFT UNIT (H-STYLE)**

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>OUTPUT COVER</td>
</tr>
<tr>
<td>52</td>
<td>OUTPUT OIL SEAL</td>
</tr>
<tr>
<td>53</td>
<td>OUTPUT BEARING (53A. CONE, 53B. CUP)</td>
</tr>
<tr>
<td>54</td>
<td>GEAR SPACER</td>
</tr>
<tr>
<td>55</td>
<td>OUTPUT SHAFT</td>
</tr>
<tr>
<td>56</td>
<td>SETSCREW</td>
</tr>
<tr>
<td>57</td>
<td>GEAR KEY (only used on size 826 and larger units)</td>
</tr>
<tr>
<td>58</td>
<td>OUTPUT GEAR</td>
</tr>
<tr>
<td>59</td>
<td>OUTPUT KEY</td>
</tr>
</tbody>
</table>

**LONG MOTOR FLANGE AND COUPLING KIT (BM-STYLE)**

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>&quot;C&quot; FACE MOTOR FLANGE</td>
</tr>
<tr>
<td>112</td>
<td>COUPLING KEY - REDUCER SHAFT</td>
</tr>
<tr>
<td>113</td>
<td>SETSCREW - REDUCER SHAFT</td>
</tr>
<tr>
<td>114</td>
<td>COUPLING GEAR - REDUCER SHAFT</td>
</tr>
<tr>
<td>115</td>
<td>COUPLING SLEEVE</td>
</tr>
<tr>
<td>116</td>
<td>SETSCREW - MOTOR SHAFT</td>
</tr>
</tbody>
</table>

**PLASTIC PLUG**

**VERTICAL SHAFT REQUIRED PARTS**

(supplied only when mounting position involves a vertical shaft)

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>OUTPUT COVER - CLOSED</td>
</tr>
<tr>
<td>130</td>
<td>OUTPUT COVER - OPEN</td>
</tr>
<tr>
<td>131</td>
<td>OUTPUT BEARING GREASE RETAINER</td>
</tr>
<tr>
<td>132</td>
<td>GREASE FITTING</td>
</tr>
<tr>
<td>133</td>
<td>SEALED BALL BEARING (only used on size 818 thru 826 units)</td>
</tr>
<tr>
<td>134</td>
<td>INPUT COVER</td>
</tr>
<tr>
<td>136</td>
<td>INPUT BEARING GREASE RETAINER</td>
</tr>
</tbody>
</table>

**COUPLING GEAR - MOTOR SHAFT**

* ONLY USED ON SIZE 842 AND LARGER UNITS

**COUPLING KEY - MOTOR SHAFT**

* ONLY USED ON SIZE 830 AND LARGER UNITS

**SUPPLIED ONLY AS OUTPUT ASSEMBLY ON 813 THROUGH 824 UNITS**

**P - PRIMARY**

**S - SECONDARY**
PARTS LIST

MODEL DM813-8100
(Refer to Double Reduction Basic Unit Components)

MODEL DMQ813-8100
(Refer to Double Reduction Basic Unit Components)

HOLLOW SHAFT MODELS
DH, DHM, DHMQ
(Refer to Double Reduction Basic Unit Components)
# PARTS LIST

## MOUNTING BRACKET OPTIONS
- **70** Horizontal Mounting Base
- **71** Cap Screw
- **72** High and Low V-Brackets
- **73** Hex Head Cap Screw
- **74** "J" Mount Bracket
- **75** "F" Output Flange (Cast)

### RATIO MULTIPLIER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Oil Seal, Output</td>
</tr>
<tr>
<td>4A</td>
<td>Bearing, Input - Extension End (n/a for TXQ)</td>
</tr>
<tr>
<td>4B</td>
<td>Bearing, Input - Inboard End</td>
</tr>
<tr>
<td>5</td>
<td>Shaft, Input</td>
</tr>
<tr>
<td>6</td>
<td>Oil Seal, Input</td>
</tr>
<tr>
<td>7</td>
<td>Flange, Motor (TXQ only)</td>
</tr>
<tr>
<td>8</td>
<td>Hex Head Cap Screw</td>
</tr>
<tr>
<td>9</td>
<td>Key, Gear</td>
</tr>
<tr>
<td>10</td>
<td>Gear, Output</td>
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<tr>
<td>11</td>
<td>Pin, Dowel</td>
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<tr>
<td>12</td>
<td>Spacer, Low Speed</td>
</tr>
<tr>
<td>13</td>
<td>Cover, Housing</td>
</tr>
<tr>
<td>14</td>
<td>Housing</td>
</tr>
<tr>
<td>15</td>
<td>Gasket, Input Cover</td>
</tr>
<tr>
<td>16</td>
<td>Gasket, Housing</td>
</tr>
<tr>
<td>17</td>
<td>Plug, Pipe</td>
</tr>
<tr>
<td>18</td>
<td>Plug, Vent</td>
</tr>
<tr>
<td>19</td>
<td>Key, Output Shaft</td>
</tr>
<tr>
<td>20</td>
<td>Cover, Input, Seal Retainer</td>
</tr>
<tr>
<td>21</td>
<td>Ring, Retaining, Internal, Input Shaft</td>
</tr>
<tr>
<td>22</td>
<td>Ring, Retaining, External, Input Shaft</td>
</tr>
<tr>
<td>23</td>
<td>Flange, Motor (TXM only)</td>
</tr>
</tbody>
</table>

*Motor Flange replaces input cover on "TXQ" Model

## ENVIROSEAL
- **170** Internal Pressure Compensation Chamber
- **171** Internal Pressure Compensation Chamber Stem plug
- **172** Internal Pressure Compensation Chamber Stem Nut

## ENVIRONMENTAL

### GROVE GEAR

ELECTRA-GEAR

www.grovegear.com
FIELD CUT TO FINAL LENGTH
36", 42-546RLP
3/4
3/4
7/16 Ø
7/16 Ø
5/16 Ø
FIEL DRILL
3/4
1 1/2
1 1/2
7/16 Ø
FIELD CUT
3
FIELD LOCATE AND DRILL
7/16 DIA HOLE THROUGH TOP
CONE. CAULK AROUND BOLT HEAD.

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TOLERANCES:

.3XX ± .005 .005
.2XX ± .010 .010
.1XX ± .020 .020
.0XX ± .030 .030

NO SCALE

DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:

DECIMAL FRACTION OVERALL
.XX ± .03 ± 1/16 <120 ± 3/8
.XXX ± .005 >120 ± 1

AIRLANCO

TYPICAL SPRINKLER
HANGER DETAIL

UNLESS OTHERWISE NOTED:
DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.
TOLERANCES:
NOTES:
1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN. @ FILTER
   CAPACITY: 31.4 GPM @ 15 PSI
   SUPPLY: 90 - 120 MINUTES.
2. USE TEFLOIN TAPE OR TFE PIPE THREADING COMPOUND.
3. SPRINKLER HEAD MUST BE INSTALLED POINTING UP FOR DRAINAGE.
4. SEE DRAWING #11308 FOR HANGER DETAILS.

ITEM | DESCRIPTION
-----|------------------
1    | 1" COUPLING
2    | 1" PIPE
3    | 1" x 3/4" REDUCING ELBOW
4    | SPRINKLER HEAD
5    | HANGER RING
Notes:
1. System Requirements:
   Pressure: 15 PSI Min. @ Filter
   Capacity: 31.4 GPM @ 15 PSI
   Supply: 90 - 120 Minutes.
2. Use Teflon tape or TFE Pipe threading compound.
3. Sprinkler head must be installed pointing up for drainage.
4. See Drawing #11308 for hanger details.

Item Description

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&quot; Coupling</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; Pipe</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; x 3/4&quot; Reducing Elbow</td>
</tr>
<tr>
<td>4</td>
<td>Sprinkler Head</td>
</tr>
<tr>
<td>5</td>
<td>Hanger Ring</td>
</tr>
</tbody>
</table>

Sprinkler Kit
64RLP Filters
NOTES:
1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN. @ FILTER
   CAPACITY: 31.4 GPM @ 15 PSI
   SUPPLY: 90 - 120 MINUTES.
2. USE TEFLOM TAPE OR TFE PIPE THREADING COMPOUND.
3. SPRINKLER HEAD MUST BE INSTALLED POINTING
   UP FOR DRAINAGE.
4. SEE DRAWING #11308 FOR HANGER DETAILS.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&quot; COUPLING</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; PIPE</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; x 3/4&quot; REDUCING ELBOW</td>
</tr>
<tr>
<td>4</td>
<td>SPRINKLER HEAD</td>
</tr>
<tr>
<td>5</td>
<td>HANGER RING</td>
</tr>
</tbody>
</table>

B 1/5/06 REDRAWN TO SCALE, ADDED TABLE, REV. HANGER JF
A 1-14-98 RELEASED TO PRODUCTION TED

UNLESS OTHERWISE NOTED:

DO NOT SCALE DRAWING.
ALL DIMENSIONS ARE IN INCHES.

TOLERANCES:
DECIMAL  FRACTION  OVERALL
.XX ± .03   ± 1/16   <120 ± 3/8
.XXX ± .005 ± 1/16   >120 ± 1

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AND SHALL NOT BE REPRODUCED, LOANED OR USED IN ANY MANNER
WITHOUT THE EXPRESS PERMISSION OF THE CO.

FALLS CITY, NE

SPRINKLER KIT
82RLP FILTERS

20210311  11035

217-988-0005
NOTES:
1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN. @ FILTER
   CAPACITY: 31.4 GPM @ 15 PSI
   SUPPLY: 90 - 120 MINUTES.
2. USE TEFLOM TAPE OR TFE PIPE THREADING COMPOUND.
3. SPINKLER HEAD MUST BE INSTALLED POINTING UP FOR DRAINAGE.
4. SEE DRAWING #11308 FOR HANGER DETAILS.

ITEM | DESCRIPTION
--- | ---
1 | 1" COUPLING
2 | 1" PIPE
3 | 1" x 3/4" REDUCING ELBOW
4 | SPRINKLER HEAD
5 | HANGER RING

SPRINKLER KIT
124RLP FILTERS
### Notes:
1. **System Requirements:**
   - **Pressure:** 15 PSI min. @ Filter
   - **Capacity:** 31.4 GPM/SPRINKLER @ 15 PSI
     - $31.4 \times 2 = 62.8$ GPM
   - **Supply:** 90 - 120 Minutes.
2. Use Teflon Tape or TFE Pipe threading compound.
3. Sprinkler head must be installed pointing up for drainage.
4. See Drawing #11308 for hanger details.

### Table
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&quot; Coupling</td>
</tr>
<tr>
<td>2</td>
<td>1&quot; Pipe</td>
</tr>
<tr>
<td>3</td>
<td>1&quot; x 3/4&quot; Reducing Elbow</td>
</tr>
<tr>
<td>4</td>
<td>1&quot; x 1&quot; x 3/4&quot; Tee</td>
</tr>
<tr>
<td>5</td>
<td>Sprinkler Head</td>
</tr>
<tr>
<td>6</td>
<td>Hanger Ring</td>
</tr>
</tbody>
</table>

**Diagram Details:**
- **Sprinkler Kit:** 188RLP Filters
- **Location:** Falls City, NE
- **Job No.:** 20210300
- **P/N:** 10530

---

**Tolerances:**
- Decimal ± .03
- Fraction ± 1/16
- Overall <120 ± 3/8
- Overall >120 ± 1
NOTES:
1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN. @ FILTER
   CAPACITY: 31.4 GPM/SPRINKLER @ 15 PSI
   31.4x2 = 62.8 GPM
   SUPPLY: 90 - 120 MINUTES.
2. USE TEFLOM TAPE OR TFE PIPE THREADING COMPOUND.
3. SPRINKLER HEAD MUST BE INSTALLED POINTING UP FOR DRAINAGE.
4. SEE DRAWING #11308 FOR HANGER DETAILS.
### Notes:

1. **System Requirements:**
   - Pressure: 15 PSI Min. @ Filter
   - Capacity: 31.4 GPM/SPRINKLER @ 15 PSI
   - Supply: 90 - 120 Minutes.

2. Use Teflon tape or TFE pipe threading compound.

3. Sprinkler head must be installed pointing up for drainage.

4. See drawing #11308 for hanger details.

---

### Items and Descriptions

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-1/2&quot; Coupling</td>
</tr>
<tr>
<td>2 &amp; 4</td>
<td>1-1/2&quot; Pipe</td>
</tr>
<tr>
<td>3</td>
<td>1-1/2&quot; Union</td>
</tr>
<tr>
<td>5</td>
<td>1-1/2&quot; x 1&quot; x 1-1/2&quot; Tee</td>
</tr>
<tr>
<td>6</td>
<td>1-1/2&quot; Close nipple</td>
</tr>
<tr>
<td>7</td>
<td>1-1/2&quot; x 3/4&quot; Bell Reducer</td>
</tr>
<tr>
<td>8</td>
<td>Sprinkler Head</td>
</tr>
<tr>
<td>9</td>
<td>1&quot; Pipe</td>
</tr>
<tr>
<td>10</td>
<td>3/4&quot; x 3/4&quot; x 1&quot; Tee</td>
</tr>
<tr>
<td>11</td>
<td>3/4&quot; Pipe</td>
</tr>
<tr>
<td>12</td>
<td>3/4&quot; Elbow</td>
</tr>
<tr>
<td>13</td>
<td>Hanger Ring</td>
</tr>
</tbody>
</table>

---

**Sprinkler Kit 312RLP Filters**

**Job No:** 20210306  **Date:** 7-31-97  **Rev:** B

**Scale:** None  **Drawing No:** 10941
## Notes:

1. **System Requirements:**
   - **Pressure:** 15 PSI min @ Filter
   - **Capacity:** 31.4 GPM/sprinkler @ 15 PSI
     
     \[
     31.4 \times 3 = 94.2 \text{ GPM}
     \]
   - **Supply:** 90-120 minutes

2. Use Teflon tape on all connections.

3. Sprinkler heads must be installed pointing up for drainage.

4. See drawing 11308 for hanger details.

### Table: Item Description

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 1/2 Coupling</td>
</tr>
<tr>
<td>2 &amp; 4</td>
<td>1 1/2 Pipe</td>
</tr>
<tr>
<td>3</td>
<td>1 1/2 Union</td>
</tr>
<tr>
<td>5</td>
<td>1 1/2 x 1 x 1 1/2 Tee</td>
</tr>
<tr>
<td>6</td>
<td>1 1/2 Close Nipple</td>
</tr>
<tr>
<td>7</td>
<td>1 1/2 x 3/4 Bell Reducer</td>
</tr>
<tr>
<td>8</td>
<td>Sprinkler Head</td>
</tr>
<tr>
<td>9 &amp; 11</td>
<td>1&quot; Pipe</td>
</tr>
<tr>
<td>10</td>
<td>3/4 x 3/4 x 1 Tee</td>
</tr>
<tr>
<td>12</td>
<td>3/4 Elbow</td>
</tr>
</tbody>
</table>

### Diagram:

- Hanger location
- See general arrangement drawing for location

---

**Sprinkler Kit 378RLP Filter**

- **Job No:**
- **Date:** 3/12/98
- **Revision:** B
- **Drawing:** 11089

---

**Sizings:**

- Decimal: +/- 0.03
- Fraction: +/- 1/16
- Overall: <120 +/- 3/8
- XXX: >120 +/- 1

---

**General Notes:**

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**Dimensions:**

- Hanger location: 74 5/8
- Hanger location: 96 9/16
- 100
- 48
NOTES:

1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN @ FILTER
   CAPACITY: 31.4 GPM/SPRINKLER @ 15 PSI
   31.4 x 4 = 125.6 GPM
   SUPPLY: 90-120 MINUTES

2. USE TEFILON TAPE ON ALL CONNECTIONS.

3. SPRINKLER HEADS MUST BE INSTALLED POINTING UP FOR DRAINAGE.

4. SEE DRAWING 11308 FOR HANGER DETAILS.

ITEM | DESCRIPTION
---|---
1, 2 & 3 | 1 1/2 PIPE
4 & 5 | 1" PIPE
6 | 1 1/2 X 1 1/2 X 1 1/2 TEE
7 | 1 1/2 UNION
8 | 1 1/2 X 1 REDUCING ELBOW
9 | 1 X 1 X 3/4 TEE
10 | 1 X 3/4 REDUCING ELBOW
11 | SPRINKLER HEAD
12 | 1 1/2 COUPLING
NOTES:

1. SYSTEM REQUIREMENTS:
   PRESSURE: 15 PSI MIN @ FILTER
   CAPACITY: 31.4 GPM/SPRINKLER @ 15 PSI
   SUPPLY: 90-120 MINUTES

2. USE TEFLON TAPE ON ALL CONNECTIONS.

3. SPRINKLER HEADS MUST BE INSTALLED POINTING UP FOR DRAINAGE.

4. SEE DRAWING 11308 FOR HANGER DETAILS.

ITEM | DESCRIPTION
--- | ---
1 | 1 1/2 COUPLING
2 & 3 | 1 1/2 PIPE
4 & 5 | 1" PIPE
6 | 1 1/2 X 1 1/2 X 1 1/2 TEE
7 | 1 1/2 UNION
8 | 1 1/2 X 1 REDUCING ELBOW
9 | 1 X 1 X 3/4 TEE
10 | 1 X 3/4 REDUCING ELBOW
11 | SPRINKLER HEAD

TOLERANCES:
DECIMAL | FRACTION | OVERALL
--- | --- | ---
.XX +/- 0.03 | +/- 1/16 | <120 +/- 3/8
.XXX +/- 0.005 | | >120 +/- 1

SPRINKLER KIT
546RLP FILTER
ITEM | DESCRIPTION
--- | ---
1 | 1 1/2 COUPLING
2, 4 & 10 | 1 1/2 PIPE
3 | 1 1/2 UNION
5 | 1 1/2 CROSS
6 | 1 1/2 CLOSE NIPPLE
7 | 1 1/2 X 1 BELL REDUCER
8 | 1 X 3/4 REDUCING ELBOW
9 | SPRINKLER HEAD
11 | 1 1/2 X 1 1/2 X 3/4 TEE
12, 14, 15 & 17 | 1" PIPE
13 | 1 X 1 X 1 TEE
16 | 1" UNION

NOTES:

1. SYSTEM REQUIREMENTS:
PRESSURE: 15 PSI MIN @ FILTER
CAPACITY: 31.4 GPM/SPRINKLER @ 15 PSI
31.4 x 5 = 157 GPM
SUPPLY: 90-120 MINUTES

2. USE TEFLOL TAPE ON ALL CONNECTIONS.

3. SPRINKLER HEADS MUST BE INSTALLED POINTING UP FOR DRAINAGE.

4. SEE DRAWING 11308 FOR HANGER DETAILS.