SAFETY, OPERATION & MAINTENANCE MANUAL

for

AARON PROCESS EQUIPMENT CO.

"NR" SERIES RIBBON and PADDLE BLENDERS

Read and understand this material before operating or servicing this equipment. Failure to do so may result in serious bodily injury or death.

MANUAL #BLD004 **3/09/94**

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I. INTRODUCTION

Aaron Process is a leading manufacturer of blending equipment. Changes in industry training and safety motivation have created a need for this manual.

This manual recognizes that the blender is only a component of a larger plant system and is limited to the mixing of dry powders or free flowing dry blends. The system may involve upstream and downstream equipment such as loaders, feeders, conveyors, hoppers etc. This manual shall pertain only to the blender component. This manual should be placed in a binder with other component's manuals to form a "system's manual".

There is nothing more important than the safety aides provided throughout this manual. The Safety Alert Symbol ⚠ is used to identify topics of safety concern wherever they appear.

People experienced in the maintenance and operation of this type of equipment provide the best feedback . Aaron Process welcomes your input concerning the contents of this manual and/or suggested additions. Send your comments to:

Aaron Process Equipmment Co. Inc.
P.O. Box 530
Bensenville, IL 60106
Attn: Customer Service
Manual #BLD004

II. PURPOSE OF THIS MANUAL

This instruction manual is intended to familiarize operating and maintenance personnel with the operation, safety and servicing procedures associated with the Aaron Process blender.

This manual should be kept available to operating and maintenance personnel. For additional copies at no charge, order manual #BLD004.

DANGER

A person who has not read and understood the operating and safety instructions is not qualified to operate this machinery.

DO NOT operate this equipment unless you understand how to use it safely.

IF YOU DO NOT UNDERSTAND ANY PORTION OF THIS MANUAL CONTACT AARON PROCESS EQUIPMENT AT (708) 350-2200 CUSTOMER SERVICE DEPARTMENT.

III. SAFETY ALERT SYMBOL

The symbol above is used to call your attention to instructions concerning your personal safety. Watch for this symbol. It points out important safety precautions. It means **"ATTENTION"**, be alert, your personal safety is involved. Read the message that follows the symbol and be alert to the possibility of personal injury or death.

DANGER
For the purpose of this manual and product labels, DANGER indicates death, severe personal injury or substantial damage will result if proper precautions are not taken.

WARNING
For the purpose of this manual and product labels, WARNING indicates death, severe personal injury or substantial damage can result if proper precautions are not taken.

CAUTION
For the purpose of this manual and product labels, CAUTION indicates minor personal injury or property damage can result if proper precautions are not taken.

The operation and maintenance of machinery may present hazards which can result in serious injury or death. Operating and maintaining the Aaron Process blender is no exception.

IV. PRODUCT DESCRIPTION

Aaron Process blenders are built with quality and pride. Every effort has been taken to assure you many years of dependable service. All standard blenders are designed to handle up to 75 lbs./cu. ft. density material. As with all machinery, proper care and maintenance will extend the life of the blender. Maintain proper fluid levels in the gearbox and grease bearings as suggested in the Maintenance section of this manual.

All internal product contact areas of the trough are brush finished unless ordered with special options. All welds are ground and polished to 150-180 grit finish. Trough ends are rolled and seam welded. the agitator is constructed of heavy material with continuous welds that are ground and polished to 150-180 grit finish. All contact areas are stainless steel while all external stiffeners, legs and supports are constructed of carbon steel primed and color coated. A single flat piece cover is affixed to the perimeter lip of the trough and furnished with a closed cell rubber gasket. This flat piece cover has a series of square holes provided for charging of product and is an integral safety grate. A framework is furnished around the safety grate with a hatch cover complete with gasket and latching hasps.

Because the blender is only a component, it may require a marriage with other equipment in the plant system. For this reason a standard 150 lbs. ANSI flange is provided as a discharge outlet. Because of the numerous valves available on the market today, the blender is adaptable to a wide range of products. As standard, a knife gate valve is furnished with the blender. Affixed to the bottom of the valve is a valve guard. A discharge clearance of 38" from the bottom of the guard to the floor is standard on all blenders.

Aaron Process blenders do require that the customer perform all wiring and furnish all electrical components and ancillary equipment. Wiring must be performed by qualified personnel and meet all local and national electrical codes. this includes the selection of electrical components required to start and operate the blender.

The drive furnished on Aaron Process blenders are of the shaft mounted type incorporating a pair of pulleys and cog "V" belts appropriately sized for the motor provided. All motors are 230-460 volts AC, TEFC design unless specified at time of order.

NOTE: Drives furnished on standard blenders are not meant to be started under load. Special components are required to allow such operation. Contact Aaron Process for further details.

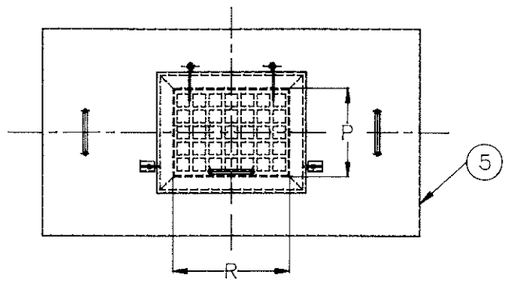
The packing gland design consist of a split housing, pusher and backing plate. Packing glands are furnished with braided rope packing.

Other options available for Aaron blenders:

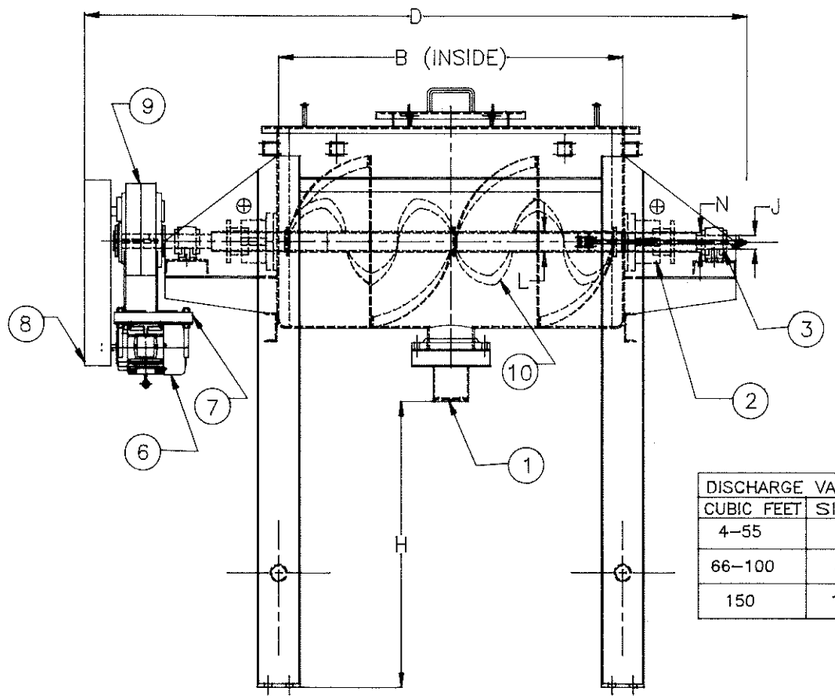
1. S/S dimple jacket (90 psi @ 350 degrees F.) non-code.
2. ASME code dimple jacket (90psi @ 350 degrees F.)
3. #4 polished wetted surfaces.
4. Air purge glands.
5. Reduced voltage starter. (Shipped loose for customer installation)
6. USDA approval.
7. Other materials of construction.

STANDARD BLENDER SIZES

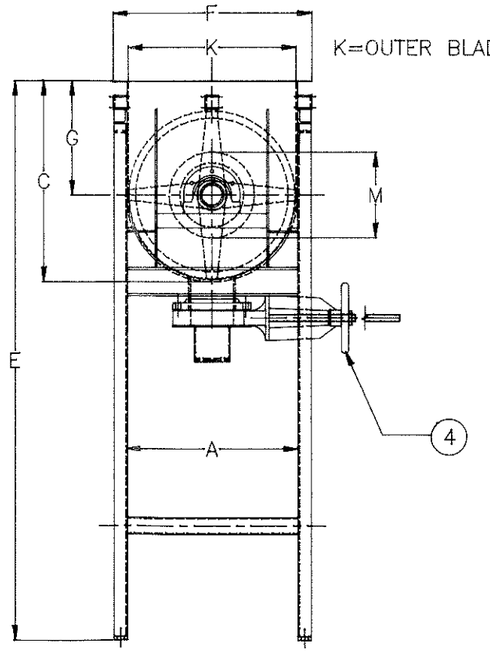
COVER			
HATCH OPENING SIZE			
CU.FT	P	R	QTY.
4	9	12	1
14	12	16	1
24	13	22	1
36	14	25	1
55	17	30	1
66	17	30	1
80	20	32	1
100	20	20	2
150	20	20	2



CU.FT.	GAL.	A	B	C	D	E	F	G	H	J	K	L	M	N
4	30	18	24	22	55	46	20	13	14	1–15/16	17–1/2	2–3/8	9	2–1/4
14	105	24	48	28	91	76	28	16	38	1–15/16	23–1/2	2–1/2	12	2–3/4
24	180	26	66	30	110	78	30	17	38	2–15/16	25–1/2	3	13	3–7/16
36	270	30	78	34	122	82	34	19	38	3	27–1/2	4	15	3–7/16
55	410	34	90	39	134	87	38	22	38	3–7/16	33–1/2	6	17	4–7/16
66	470	36	96	41	154	89	41	23	38	3–15/16	35–1/2	6	18	4–7/16
80	600	40	96	48	154	96	44	28	38	3–15/16	39–1/2	6	20	4–15/16
100	750	48	96	54	152	102	52	30	38	4–7/16	47–1/2	8	24	5–7/16
150	1125	48	144	54	202	102	52	30	38	4–15/16	47–1/2	8	24	5–7/16



DISCHARGE VALVE	
CUBIC FEET	SIZE
4–55	6"
66–100	8"
150	10"



DET.	DESCRIPTION
1	VALVE GUARD
2	GLAND ASSEMBLY
3	SUPPORT BEARING
4	DISCHARGE VALVE
5	TOP COVER
6	MOTOR
7	MOTOR MOUNT
8	BELT GUARD
9	TRANSMISSION
10	AGITATOR

RECEIVING

Uncrate machinery and check for any damage. Claims for any damage done in shipment must be made by the purchaser against the transportation company.

SAFETY DEPENDS ON YOU!

Aaron Process blenders are designed and built with safety in mind. however, your overall safety can be increased by proper installation and thoughtful operation on your part. Read and observe all instructions and specific safety precautions included in this manual. Most importantly, think before you act and be careful.

In a continuing effort to insure that safety shall be of the utmost concern to all involved with our machinery, Aaron encourages any suggestions that might improve the customers understanding of our safety standards.

INSTALLATION

It is the user's responsibility to ensure safety regarding his process. Complete process safety procedures must be understood by all operators of the machine and written instructions provided, where neccessary, by the owner. This blender is only a component of an entire plant system. Any ancillary equipment to be associated with the blender must be installed in a manner that meets or exceeds ANSI and OSHA standards. The safety and welfare of personnel operating or maintaining the unit shall be the number one concern.

NOISE

We cannot predict or give a guarantee on noise levels you will encounter under your operating conditions. The following are some factors to consider before machine installation.

A. DURATION Based on your lab test and past experience, you should have an estimated mix cycle time. In general, the longer the mix time expected, the more emphasis must be placed on noise control. Reference OSHA and EPA Noise Exposure Recommendation Tables.

B. PRODUCT The product to be processed in the machine has a very pronounced effect on the amount of noise generated. A good rule of thumb is that the more coupled horsepower required, the more noise there will be. Therefore, careful attention should be given to the product this machine was purchased for and any possible future products it is to be used on.

C. MOUNTING The machines are generally designed to be bolted to the floor for most applications. the same precautions that are used for any large machine installation must be followed, and if conditions warrent, sound and vibration dampening mounts should be used. There are many companies that specialize in machine installation and a good source of both technical advice and related hardware is usually available by consulting the local phone book under "Machinery Movers," "Millrights" or "Riggers" headings.

All conventional material/machine handling safety practices must be adopted during movement, installation, cleaning and general repair work. It shall be the employer's responsibility to place and locate the blender in his plant and provide any additional safety features which become necessary because of equipment location. It shall be the employer's responsibility to ensure that the controls for starting the machine are properly connected with safety devices and also located so that it can't be accidently started. Because the blender is a component and may associate with other equipment in the plant, it should be installed in a manner that meets or exceeds ANSI and OSHA requirements for safety in production line installation.

The machine shall be firmly secured to a level foundation with proper anchoring devices. the use of shims and grouting is acceptable.. Placing this unit on an unlevel surface can cause misalignment of drive components and stress on the structural frame of the blender. (See paragraph 2C, page 9)

The blender is furnished with rigging holes in the end ribs on the drive and idle ends. The blender should be slinged or chained in this area for moving of blender. Under no circumstances should the blender be raised with a fork lift under the belly of the machine. Appropriately rated nylon straps can be wrapped beneath the blender and supported from above if preferred.

When installation is complete: wiring, lubrication and testing of components can commence. For units with direct drive couplings, it will be necessary to re-align the coupling after unit has been installed.

TOOLS

The employer must provide adequate and safe tools and equipment necessary for the installation and maintenance of these machines.

ELECTRICAL, HYDRAULICS & PNEUMATIC UTILITIES

Every electrical installation and all equipment installed, replaced, modified, repaired or rehabilitated shall comply with the provisions of the latest National Electrical Code. Use properly rated hoses, oil, fittings, etc., for the service required by the machine. The proper use, installation, location and maintenance of various hydraulic and pneumatic and mechanical components is the users responsibility.

LOCATION OF SAFETY MANUAL

A copy of the manual is shipped with the unit in a holder. It shall be the owners responsibility to insure the availability of the Manual for the use of the operator. Additional copies of the Operators Safety Manual will be provided upon request.

CONTROLS

The blender, as a component, can be installed in a number of ways. Electrical wiring installations with upstream and downstream equipment in your production line generally requires customization.

For this reason, Aaron Process does not provide controls, wiring or install the electrical components required for operation. Stringent safeguards must be taken, by the owner of this equipment, to wire the component/blender in a manner that will meet or exceed OSHA, Local and National electrical codes.

Experienced professional help is available by consulting your local phone book under the headings "ELECTRICAL CONTRACTOR" or "ELECTRICAL ENGINEERS". Be certain that the vendor is familiar with installation in production line procedures.

RESALE

Because of the general purpose of the various machines, they are shipped from the factory with safety devices for normal operation. These devices must be in good working order and must be included with the machine if it is resold. Some machines are purchased for specific applications and may **NOT** be suitable for other uses without some modification. It shall be the responsibility of the person rebuilding or modifying these machines to do so in accordance with all applicable existing ANSI and/or OSHA safety standards.

NON-PRESSURE VESSELS

Only machines with an ASME code plate can be subjected to pressure applications.

Your machine may be equipped with jackets for heating and cooling. Relief valves must be installed to prevent accidental pressure build up due to restricted discharge valves.

DANGER

Portions of the equipment may become hot during use. Protection to employees should be provided from surfaces over 130 degrees F. or lower than 20 degrees F.

Protection can be provided by one of the following methods.

1. Guard by distance, as with guardrails.

2. Insulation may be ordered with the equipment or installed by the owner/user to bring the surface temperature within the 130 degrees F. to 20 degrees F. range. Upon the installation of external insulation and sheathing, it is imperative that the reapplication of safety warnings and labels be done immediately. Please call Aaron Process if additional labels are required.

DANGER

Personnel must be protected from both primary exposure, i.e., the surface itself causing burns and blisters, etc., and secondary exposure, i.e., if a person touches an abnormally hot or cold surface and withdraws ("jumps back") rapidly. This may cause a fall from a platform or movement into the path of a forklift truck, etc.

The piping of the jacket shall be performed by qualified personnel experienced in the plumbing of machinery compatible with/or exceeding the requirements of the medium used for heating and cooling the vessel.

PRESSURE VESSELS

Pressure rated vessels shall follow these requirements:

Located on the machine is an ASME code plate which contains the machine serial number, ASME registration number and the allowable tank and/or jacket pressure with temperature compensation. It is the user's responsibility to supply all required relief valves, fittings, piping and safety devices to meet state, local, national and industry boiler codes. The user is responsible for complying with these codes and maintaining this equipment in a safe condition. More information on pressure vessels should be obtained from your insurance carrier, ASME Boiler Code or consulting engineering firm.

DANGER

Portions of this equipment may become hot during use. Protection to employees should be provided from surfaces over 130 degrees F. or lower than 20 degrees F.

This protection will fall into one of the following general categories.

1. Guard with distance as with guardrails.

2. Insulation may be ordered with the equipment or installed by the owner/user to bring the surface temperatures within the 130 degrees F. to 20 degrees F. range. Upon completion of insulation and sheathing, it is imperative that the warning and safety labels be re-applied to the outside of the sheathing. Please call Aaron Process if additional labels are required.

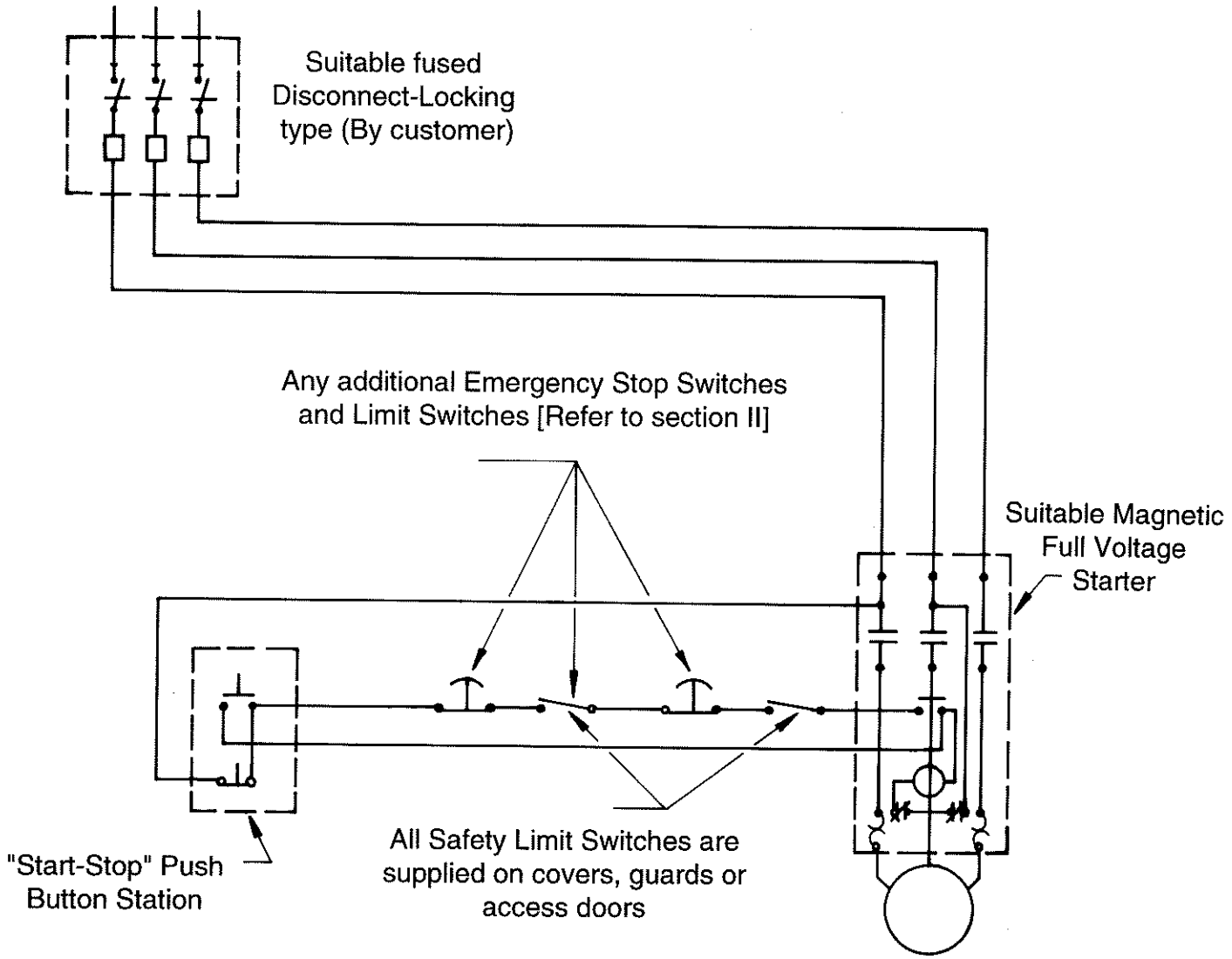
DANGER

Personnel must be protected from both primary exposure, i.e., the surface itself causing burns, blisters, etc., and secondary exposure, i.e., a person touching an abnormally hot or cold surface may withdraw ("jump back") rapidly and this may cause a fall from a platform or movement into the path of a forklift truck, etc.

NOTE: All pressure vessels are tested for structural integrity with hydrostatic test procedures per ASME. These tests do not include any internal components such as swing arms, etc., unless this was specified on the original purchase order.

The piping of the jacket shall be performed by qualified personnel experienced in the plumbing of machinery compatible with/or exceeding the requirements of the medium used for heating and cooling the vessel.

TYPICAL WIRING DIAGRAM



Note: Be sure all wiring and components comply with applicable Federal, State and local regulations as well as current national safety standards.

DANGER

This machine must be electrically grounded. Failure to do so could result is serious injury or death by electrocution.

GENERAL SAFETY INSTRUCTIONS

Following are general rules for the operation of the blender. Any deletions and/or modifications to these rules and/or equipment for specific applications are the responsibility of the user and should be carefully checked for potential hazards.

1. The Operator's Safety Manual that is furnished with the machine must be readily available. All personnel working with this equipment must be familiar with all applicable safety rules. The user of this equipment must review all safety precautions listed in this manual and be responsible for its correctness and completeness for his particular application.

2. All guards, covers, safety switches and related safety equipment have been checked at the factory. These must be kept in good working condition and the machine is **not** to be operated without them. It is the responsibility of the user to ensure that no unsafe condition occurs because of the nature of the process, machine use or additions to or deletions from equipment furnished.

3. All maintenance work must be performed by qualified personnel.

 **CAUTION:** Your machine may be furnished with an explosion proof motor. Any repairs to the motor must be made by a certified motor repair shop. The machine itself is **not explosion proof**, only the motor (if so equipped).

4. The electrical supply must be **locked** in the **"off"** position and the unit is a **zero mechanical state** before any maintenance is begun. If the electrical disconnect is not in a convenient location, a **"lockable"** disconnect shall be located near the machine.

5.  **DANGER:** It is extremely important that the machine is completely free of hazardous materials **before entering vessel** for maintenance or other purposes. The vessel/machine should be cleaned insofar as possible with compatible detergents, solvents, etc., and washed clean with hot water wherever applicable. Consult with your supervisor or commercial supplier for recommendations. A source of fresh air, such as a clean, **oil-free** plant air line, can be supplied by fastening a hose into the open discharge valve wherever applicable. It is critical that fresh, clean air be available for anyone working inside the vessel/machine and that **no vapors be present** which might overcome the worker, or constitute a fire or explosion hazard. It is also **imperative** that no person enter the vessel/machine unattended. An observer shall be outside the machine watching the worker **at all times** while the worker is inside. If the worker is overcome due to lack of oxygen or from vapors, the observer can provide or obtain immediate emergency assistance. Failure to station an observer outside the vessel could be fatal for the worker inside.

6. Safe maintenance procedures should always be followed. Some machines have moving parts that are hidden while in operation (eg., ribbon agitator sweeps across discharge valve). The operator must wait after switching off the machine until the machine/component has come to a dead stop before placing any tool or part of the body into any opening of the machine. He must also assure that the machine cannot be accidentally restarted by himself or other personnel. OSHA requires **locking** the main power supply in the **"OFF"** position and bringing the unit to a zero mechanical state. (See section titled **LOCK OUT PROCEDURE**). This requirement is in addition to the other safety requirements. Some moving parts or other hazards can be exposed during normal operation. Check to assure that no unintended motion will occur, **no shock of fire hazards exist**, no sharp edges are exposed and that toxic materials are not released.

OPERATIONAL SAFETY

Because the blender is a component of an entire plant operation, safeguards must be in place prior to running the unit or when a shift change occurs.

1. The employer must train and instruct personnel in safe methods of operation and proper use of all safety devices provided. The employer must ensure that, by adequate supervision, correct operating procedures are being followed. The employer should set up a "CHECK OFF" list to be completed by the operator at the start of each shift, to ensure that operators are kept aware of procedures to follow in operating the equipment safely.

2. The employer must provide clearance between equipment, so movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, etc., must also be provided. All surrounding floors should be kept in good condition and clean.

3. The employer must provide necessary protective equipment, such as face shields, gloves, etc.

THE FOLLOWING, MINIMAL RECOMMENDATIONS SHOULD BE FOLLOWED BY THE OPERATOR.

1. Become familiar with all the safety rules and labels on the unit and know their meanings. Follow any additional safety procedures outlined by your employer.

2. Check all guards, covers, limit switches and related safety equipment. Limit switches must be tested daily and during any shift changes. The machine is not to be operated without these devices in proper working condition. The limit or proximity switch is of the magnetic type, and is located on the cover. When functioning properly, the blender should be de-energized when the cover is lifted while in operation.

3. Make sure blender is free of any foreign objects internally.

4. Make sure personnel stand clear during start up and loading.

5. Make sure the entire production line associated with the blender is free and clear of any maintenance or operation personnel on other line components. (Upstream or downstream)

6.  **DANGER:** Agitator blades sweep across discharge opening and feed opening. Will immediately amputate inserted limbs.
Never insert limbs into discharge or feed inlet!

7.  **DANGER:** Drag-in hazard
Never use hoses or electrical cords near running machinery.

8.  **DANGER:** Electricals can cause explosion
Use only explosion-proof electricals in explosive environment.

9.  **DANGER:** Rotating parts will cause serious injury of death.
Do not operate without guards in place, Disconnect and lock out power before removing guards.

10.  **DANGER:** Projectiles can cause serious eye and facial injuries.
Never use high pressure water and air hoses for cleaning.

11.  **DANGER:** Use appropriate personal protective devices, such as, safety eyewear, non-slip shoes, hearing protection and chemical resistant clothing.

12.  **DANGER:** Portions of the equipment may become hot during use. Safeguards must be taken for protection against surfaces over 130 degrees F. or lower than 20 degrees F.

13.  **DANGER:** Use only in adequately ventilated areas or with proper masking to prevent any toxic inhalation or poor air.

MAINTENANCE SAFETY

Maintenance of this machinery includes, but is not limited to the following, and all safeguards and precautions must be taken to ensure the personal welfare and safety of all involved in performing maintenance procedures.

A. Cleaning
B. Servicing
C. Repairing
D. Troubleshooting
E. Lubricating
F. Inspecting

 **DANGER**

Lockout power disconnect switch and allow agitator blades to come to a complete stop before performing maintenance procedures.

See Lockout/Tagout Procedures on the following pages.

Pressing a **"STOP"** button or de-energizing, will stop the equipment; however, revolving or rotating members will coast or continue movement for a period of time; **DO NOT** enter or insert any tool or portion of your body into vessel until all movement has **STOPPED**, and machine is brought to a zero mechanical state. (See page 24)

LOCKOUT PROCEDURES

This unit is a component of a larger plant system. Lockout procedures shall apply to upstream and downstream equipment to prevent any accidental startings from remote stations elsewhere in the production line while the unit is being maintained.

DANGER

All power supplies **MUST BE LOCKED** in a de-energized state, which may be accomplished by the following "lockout" procedure.

(Machine must also be brought to a Zero Mechanical State - See page 24)

PROCEDURES FOR LOCKOUT ELECTRICALS

1. Only locks purchased from a reputable lock company shall be used to lock out switches. No two locks shall be the same. For identification, locks may be painted various colors to indicate types of craft to which the lock applies or differentiate shifts. Each lock shall be stamped with the employee's name or clock number.

2. Only one key shall be issued to each maintenance man for his lock. The supervisor shall keep a master list of key and combination numbers and an extra key to each lock in his station. Under no circumstances shall the supervisor lend his own extra key, even though the workmans key may seem lost beyond recovery. The supervisor must use the extra key himself until the old lock and extra key are replaced. The old lock and extra key are to be destroyed.

3. Padlocking , "locking out", must be done at or as close to the power source as possible. "Locking out" or otherwise attempting to make **"START"** and **"STOP"** buttons inoperative **IS NOT SUFFICIENT.**

EQUIPMENT LOCKOUT PROCEDURES: (CON'T)

4. Make sure that the circuit being locked out is the correct one for the equipment to be worked on. Attempt to start the equipment after lock out has been accomplished; if equipment does not start, it has been successfully **"LOCKED OUT"**.

5. Each person working on the equipment shall place his own lock on the switch.

6. If two or more workers are working on a job, then **EACH WORKER** shall attach **HIS OWN** lock so that the controls cannot be operated until all locks have been removed. Each repairman shall be impressed with the fact that, even though someone else has already locked the controls, he will not be protected, unless he attaches his own lock.

7. If the controls are so located that only one lock can be accommodated, it is recommended that a **DOUBLE INTERLOCKING** hasp be used. This will allow additional locks to be used by other personnel working on the unit at the same time.

8. If a job has not been completed by the end of the shift, the workers leaving the job shall not remove their locks until the oncoming shifts workers have attatched their own locks.

9. Where the controls are some distance from the operation under repair, it is recommended that tags be attatched to the locks, naming the department where the work is being done and the person who is responsible for the repair work. The supervisor will then have the information he needs to control some of the hazards to adjacent departments.

10. When electrical work is being done on a piece of equipment, the lock shall be placed on the main switch. A short in the wiring or tampering with the magnetic contactors could energize the circuit.

11. Regardless of what method of "locking out" is used, effective control can be maintained only by constant supervision and by training workers in the safe procedure to be followed.

ZERO MECHANICAL STATE (ZMS)

Because of the versatility of this machine as a component, the actual connection of all electrical and associated ancillary equipment, including safety devices, is the responsibility of the user. A typical wiring diagram can be found on page 16, section 1. A limit switch is provided on the unit and should be wired so that the lock out procedure can be achieved for maintenance or repair work.

Zero Mechanical State (ZMS): The act of shutting off and locking out the electrical power disconnect is **not sufficient** to minimize hazards during maintenance. Other potential sources of energy that may produce a mechanical hazard must also be minimized, (eg., turning off compressed air, lowering suspended loads, relaxing stored energy springs, relieving pressurized hydraulic fluids, etc.), and are necessary procedures to achieving ZMS.

THIS UNIT MUST BE IN A ZMS STATE PRIOR TO PERFORMING ANY MAINTENANCE PROCEDURES.

ENTERING VESSELS

Warning

Under no circumstances shall a person reach into this equipment to obtain samples, check machine function, clean or for any other reason until the machine has been locked out and all motion has ceased. Failure to observe this procedure may result in severe bodily injury or death. Refer to Lock-Out procedures, section 2, pages 22-23 & ZMS, section 2 page 24.

Lock all power supplies off and wait for all "machine movement" to cease before placing any part of the body or object in machine openings. Each person who will enter or be in contact with this equipment must use a separate lock. Reference "Multiple Lock Use" in the Lockout/Tagout section on pages 22-23 of this manual. Failure to obey this rule can result in severe bodily injury or death.

If personnel are to go into the machine, the following rules must be adhered to:

The unit must be Lock-Out and in Zero Mechanical State.

It is extremely important that the machine be completely free of hazardous material **BEFORE ENTERING THE VESSEL** for maintenance, cleaning or other purposes. The vessel/machine should be cleaned with hot water wherever applicable. A source of fresh air, such as clean oil-free plant air line, can be supplied by fastening a hose into the open discharge valve. It is critical that fresh clean air be available to anyone working inside the vessel/machine and that **NO VAPORS BE PRESENT** which might overcome the worker or constitute a fire or explosion hazard. Consult the supplier of materials being processed for material safety data sheets and proper cleaning mediums.

It is **IMPERATIVE** that no person enter the vessel/machine unattended. An observer shall be outside the machine watching the worker **AT ALL TIMES** while the worker is inside. Failure to station an observer may result in a worker being overcome due to lack of oxygen or from vapors, and not receiving emergency assistance. Such a mishap could cause death.

Reference "Permit-Required Confined Spaces" 29 CFR Part 1910, Federal Register, Vol. 58, No. 9, 1/14/93, pages 4462-4563.

SAFETY LABELS

To help insure safe operation and maintenance of this equipment, all personnel working with it should be familiar with these typical warning signs and signal words defined by ANSI and OSHA.

DANGER

For the purpose of this manual and product labels, **DANGER** indicates death, severe personal injury or substantial damage will result if proper precautions are not taken.

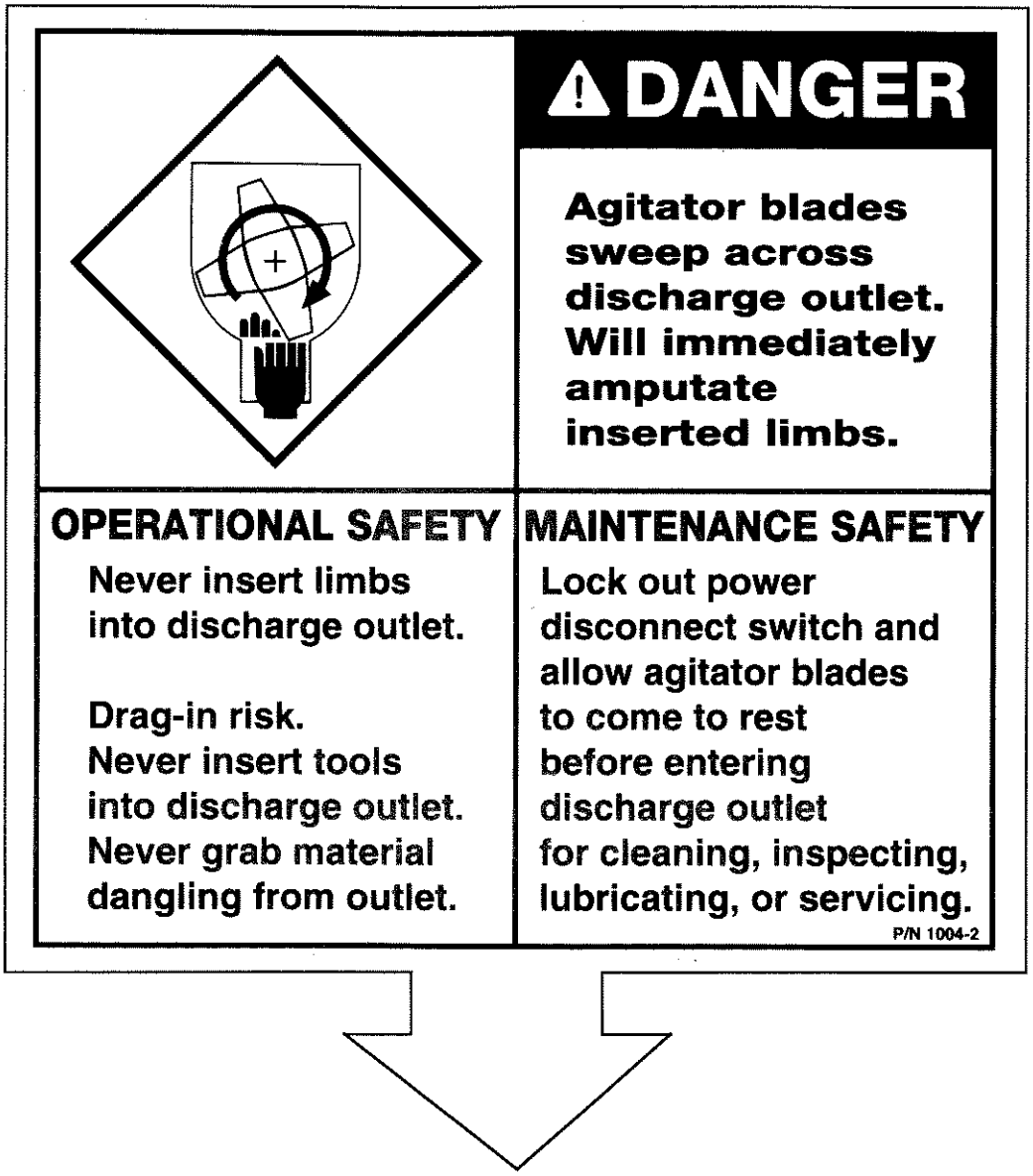
WARNING

For the purpose of this manual and product labels, **WARNING** indicates death, severe personal injury or substantial damage can result if proper precautions are not taken.

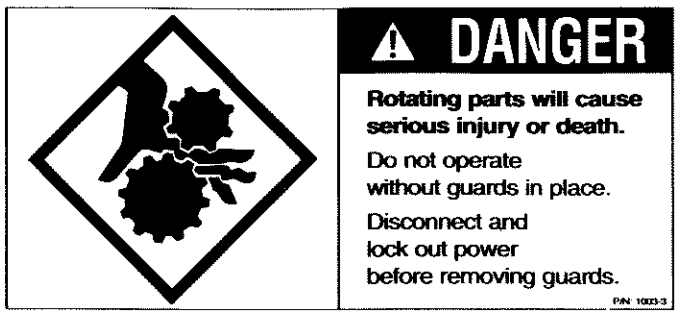
CAUTION

For the purpose of this manual and product labels, **CAUTION** indicates minor personal injury or property damage can result if proper precautions are not taken.

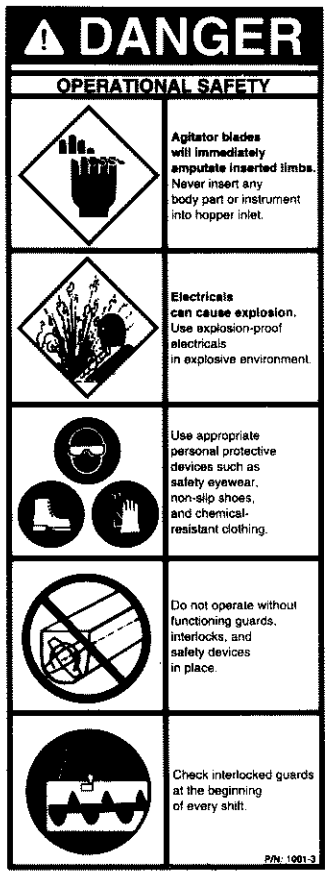
Typical labels that can be found on each blender.



Can be found located on each side of the blender, midway, just above the discharge outlet.



Can be found affixed to the front of the belt guard for the drive.



Can be found located on the top cover of the blender near the feed opening.

Can be found located at each end plate of the blender.

SAFETY FIRST

Be aware of safe operational procedures prior to operation. Read and understand all instructions in the manual supplied with this machinery. Most of all stay alert and be careful. P/N 1006-3

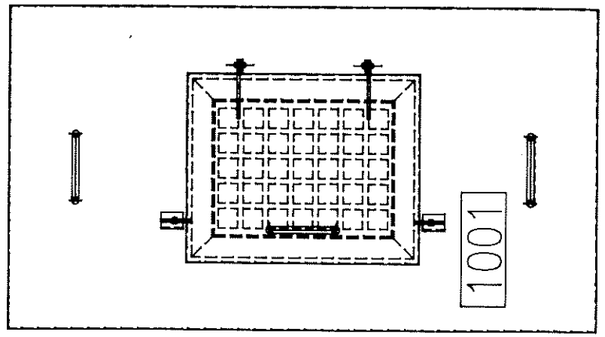
NOTICE

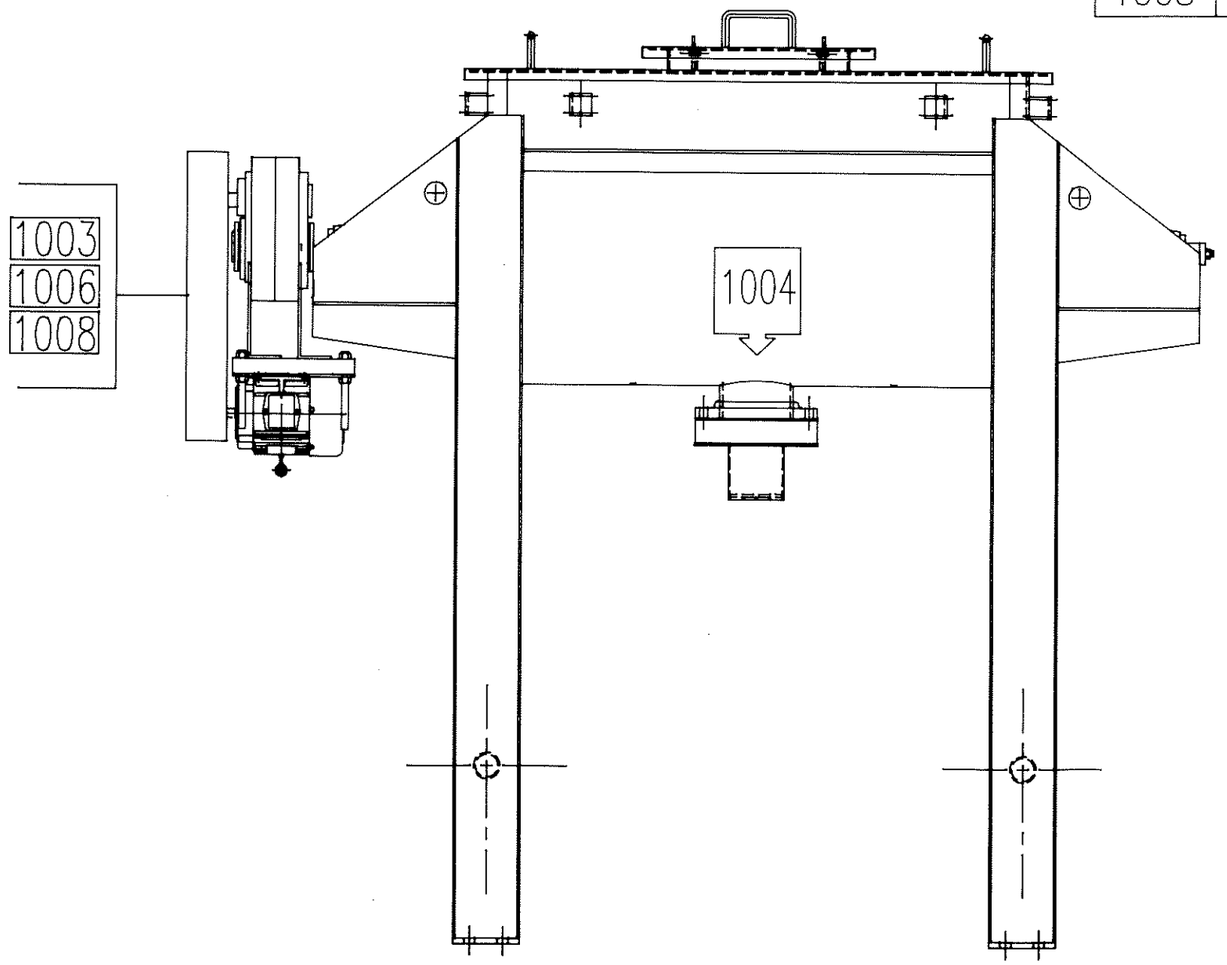
Check and maintain proper oil level in gearbox to prevent premature wear. Grease and maintain bearings on a periodic basis. Consult operators manual for proper maintenance procedures. P/N 1008-3

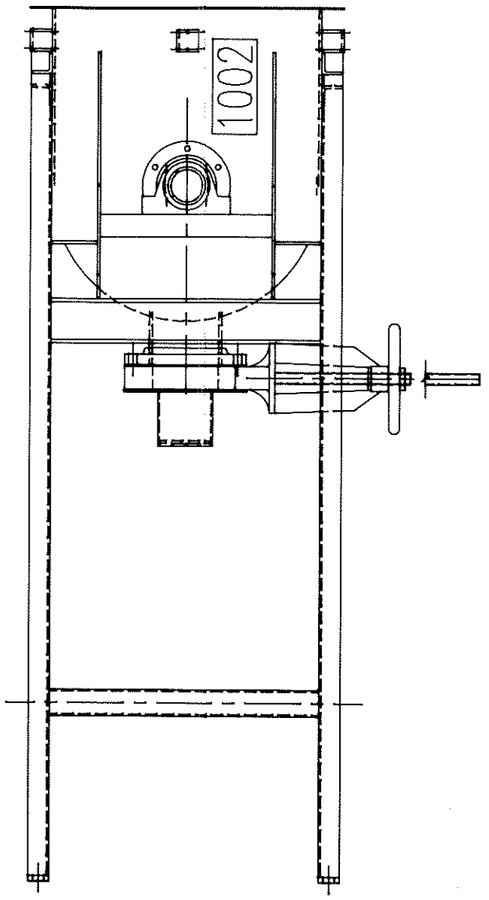
Both informational labels can be found on the front face of the belt guard of the drive.

SAFETY LABEL LOCATIONS

PART#	DESCRIPTION	LOCATION
1001	OPERATIONAL SAFETY	TOP COVER NEAR HATCH
1002	MAINTENANCE SAFETY	EACH END OF BLENDER
1003	DANGER (ROTATING)	ON BELT GUARD
1004	DANGER (DISCHARGE)	EACH SIDE OF DISCHARGE VALVE
1006	SAFETY	ON BELT GUARD
1008	NOTICE	ON BELT GUARD







RIBBON BLENDER OPERATION

The blender as a component is limited in uses to the mixing of various dry blend materials. Blending of material itself generally involves a system. Such systems usually involve loaders/feeders, conveyors, hoppers, chutes, baggers, etc. The blender, which is only a component in the overall system, is the main focus of this operation section.

The Unit must not be started under load. Only units ordered with proper drive components can be started under load. Units can run or start under loads only if the drive has been arranged to accommodate this type of procedure (eg., soft starters, fluid couplings, etc.). It is not recommended for the unit to be started under load without the installation of a device to minimize the "shock" that various components of the blender would experience if started with a full load across the line.

LOADING

Prior to loading, check that the discharge valve is closed and the agitator is rotating in its intended direction, as illustrated by rotation labels at each end of the blender. Do not operate the unit with the agitator rotating in a direction other than specified by the directional labels. Doing so may result in poor blends, damage to blender components and insufficient discharge of product.

MIXING

During the mix cycle, other ingredients can be added through the cover hatch while the unit is running.

DANGER

By no means should the blender be entered for sample taking while the unit is running. The unit must be in a Zero Mechanical State prior to performing this procedure.

DISCHARGING

The DeZurik Knife Gate discharge valve utilized on the blender can regulate the discharge of product by opening the knife portion of the discharge valve to various positions. By no means should the discharge guard located at the bottom of the valve be removed. This is for your protection. Should the standard valve not be utilized, this guard must be placed on the valve to be used. If any product jamming occurs in the discharge outlet, do not poke, prod, or insert any portion of your hands or body to help release the product. To alleviate this problem, hammer on the neck of the discharge flange with a rubber mallet while the discharge valve is opened and the unit is running. If this method proves unsuccessful, then it will be necessary to shut down the unit to Zero Mechanical State to free the packed or jammed product in the discharge area. Do not restart the unit under load. It will be necessary to discharge as much product as possible when in a ZMS state. However, if the drive was furnished to accommodate full load starts, then the unit can be energized to complete discharging. See section 2, page 24, and Lock-Out Procedures- section 2, page 22-23.

 **DANGER**

While running, the agitator blades sweep across the discharge opening immediately severing any items enterning the mixer. Do not put any part of your body in the mixer.

The discharge neck provided on the blender is adaptable to a wide range of valves on the market. As standard Aaron Process provides a manually operated knife gate valve. If the standard valve is not utilized, then the discharge valve guard must be placed on the valve being used. It shall be the users responsibility to adapt some means of protection at the discharge outlet if the original valve is replaced. This includes discharging devices utilized for, but not limited to, the following processes and discharging means.

1. 55 gallon drums
2. Hoppers
3. Diverter valves
4. Ducting/Pneumatic conveying
5. Screw conveyors
6. Belt Conveyor
7. Air locks
8. Bagging
9. Chute

MAINTENANCE

All electrical supplies and ancillary components are to be supplied by the owner. Aaron Process can purchase components, specified by the owner, and ship uninstalled with the unit. Owner is to have the unit wired by a certified contractor. It is the responsibility of the owner of this equipment to assure compliance with all National and Local electrical codes. Any repairs MUST conform to these codes.

A typical wiring diagram follows on page 35. It is important that safeguards be taken to assure the safety of the operator. A few recommendations are as follows.

1. A power disconnect switch with lockout capability should be within line of sight and preferably on the machine.

2. Interlocks must be wired at 110V. Interlocks need reset capability at 110V or less.

3. Interlocks furnished on unit are not explosion proof. Refer to National and Local electrical codes for explosion proof requirements.

4. Provide an emergency stop button on the control panel.

5. Provide a push to stop/pull to start control with a built-in light.

6. Where significant coast-down time occurs, a spring set brake should be placed on the motor.

7. Controls should be located at the operators station and close to the motor.

8. All controls are to be clearly labeled and comply with the National Electrical Code.

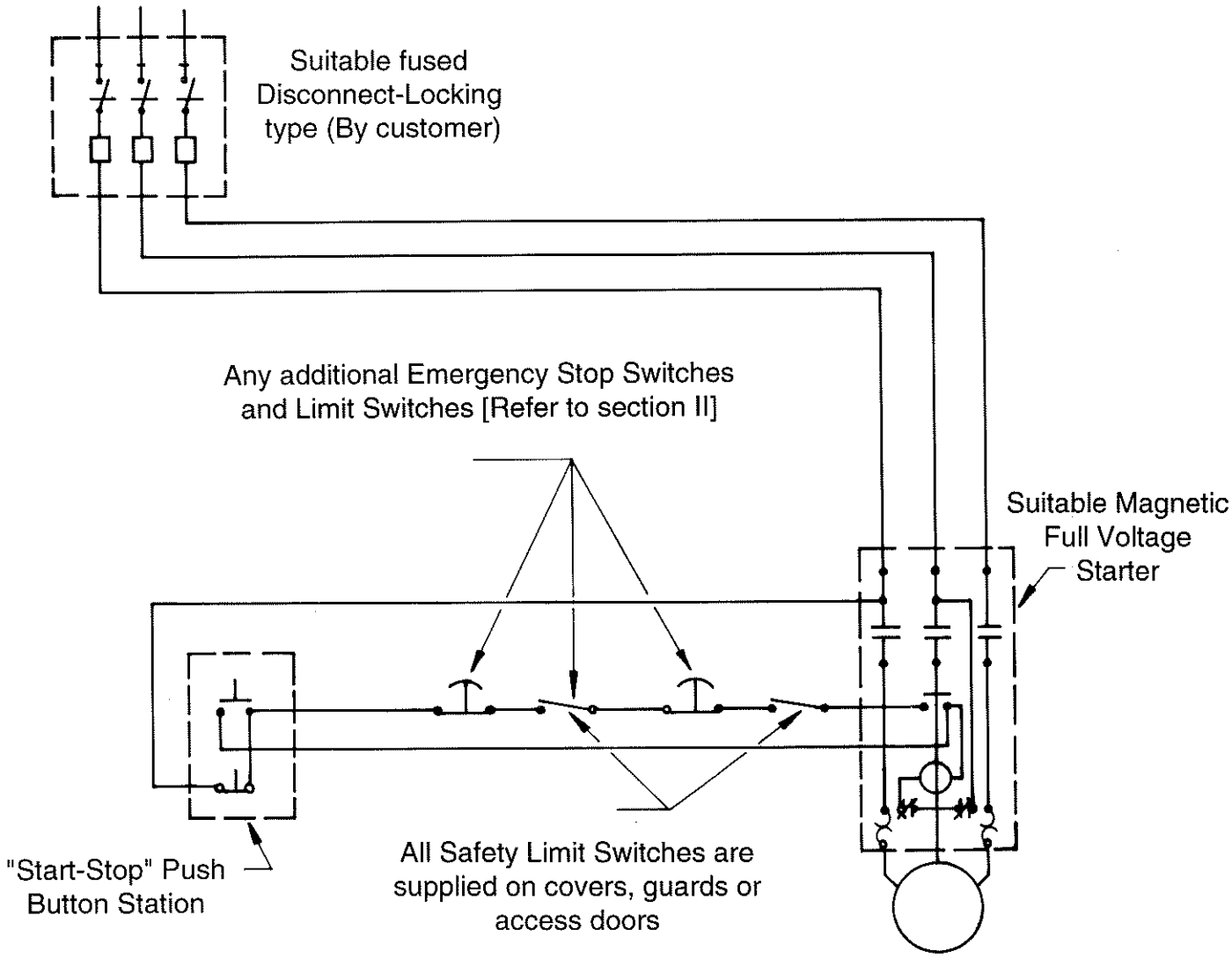
DANGER

9. Because the blender is only a component of a complete processing system, the wiring must not be limited to only the blender. Any other components, (eg: upstream and downstream equipment), associated with the blender must be wired in conjunction with each other so that if one part of the line is down, it will be impossible to energize other components within the line. This would eliminate the hazard of serious injury or death to personnel performing maintenance or repair procedures on the line.

DANGER

10. Blenders with external heating or cooling shells (jackets) are subject to extreme temperatures. Prior to performing any maintenance procedures, be sure that temperatures are within tolerable working limits. Failure to do so may result in severe burns to parts of the body that may come in contact with very hot or very cold surfaces.

TYPICAL WIRING DIAGRAM



Note: Be sure all wiring and components comply with applicable Federal, State and local regulations as well as current national safety standards.

DANGER

This machine must be electrically grounded. Failure to do so could result is serious injury or death by electrocution.

RELIANCE ELECTRIC

INSTRUCTIONAL MANUAL FOR DODGE

SET SCREW AND ECCENTRIC COLLAR MOUNTED BALL BEARINGS

INSTALLATION

⚠ DANGER

To ensure that the drive is not unexpectedly started, turn off and lock out power source before proceeding. Failure to observe these precautions could result in bodily injury. See Lock-Out Procedures section 2, page 23-23.

1. Clean shaft and bearing bore thoroughly. File flats on shaft at setscrew locations to permit easy removal of bearing.

2. Slip bearing into position. Be sure that bearing is not on a worn section of the shaft. For tighter fits, tap inner ring face with brass rod. **DO NOT HAMMER ON HOUSING.**

3. The bearing outer ring OD is spherical and swivels in the housing to accommodate misalignment. Snug hold-down bolts and use shaft to swivel each bearing until its final position is in the center of free movement top to bottom as well as side to side. Pass shaft through both bearings without forcing. This will prevent preloading of the bearing. Flat washers should be used with hold-down bolts to protect coated housing. Housing slippage depends on the mounting hold-down bolt tightening torque, number of bolts and friction characteristics between surfaces. Coated housings have reduced friction characteristics. Auxiliary load carrying devices such as shear bars are advisable for side or end loading of pillow blocks and radial loads for flange units where normal to heavy loading or shock loading is encountered.

4. Shim mounting surfaces for full contact and vertical shaft adjustment - tighten hold-down bolts to proper torque (Table 1). Turn shaft by hand. Resistance to turning should be the same as for full tightening of hold-down bolts.

5. For Set Screw Mounted Bearings, the setscrews should be tightened alternately and in small increments tot he torque specified in Table 1. After 24 hours operation, the setscrews should be tightened to the torque in Table 1 to assure full locking of the inner race to the shaft. Care should be taken that the socket key is fully engaged in the setscrew and held square with the setscrew to prevent rounding out of the setscrew socket when applying maximum torque. Do not drill through the setscrew holes for spot drilling of the shaft. (Some inner rings have tempered setscrew threads and can be damaged by a drill.) If spot drilling is required, locate bearings on the shaft and center punch through the setscrew hole. Remove bearing and spot drill the shaft, then reassemble bearing over the spot drill position and assemble as above. Milled or filed flats are preferable to the spot drilling.

6. For eccentric collar mounted bearings, slide collar against cam end of inner race. Use a punch in the hole provided in the collar, tap collar smartly in the direction of shaft rotation. Tighten setscrews to proper torque (Table 1). To remove bearings, loosen setscrew and tap collar in the direction opposite of shaft position.

RECOMMENDED TORQUE FOR SCREWS AND BOLTS
Table 1

SET SCREWS				MTG. BOLTS	
SET SCREW SIZE	HEX KEY ACROSS FLATS	STANDARD BALL BEARING INSERT	CORROSION RESISTANT STAINLESS STEEL	BOLT SIZE	RECOMMENDED TORQUE
(IN)	(IN)	MIN-MAX (IN/LBS)	(IN/LBS)	(IN)	(IN/LBS)
#10	3/32	28-33	25	3/8-16	240
1/4	1/8	66-80	60	1/2-13	600
5/16	5/32	126-156	117	5/8-11	1200
3/8	3/16	228-275	206	3/4-10	2100
				7/8-9	2040
(MM)	(MM)	MIN-MAX (N-M0	(N-M)	(MM)	(N-M)
M5	2.5	3.2-3.7	2.8	M10	29
M6	3	6.2-7.7	5.8	M12	50
M8	4	17.8-13.4	13.4	M16	124
M10	5	26-31	23	M20	238
				M22	322

LUBRICATION

High Speed Operation - In the higher speed ranges, too much grease will cause overheating. The amount of grease that the bearing will take for a particular high speed application can only be determined by experience. If excess grease in the bearing causes overheating, it will be necessary to remove grease fitting to permit excess grease to escape. The bearing has been greased at the factory and is ready to run. When establishing a relubrication schedule, note that a small amount of grease at frequent intervals is preferable to a large amount at infrequent intervals.

LUBRICATION GUIDE: USE A No 2 LITHIUM BASE GREASE OR EQUAL

HOURS RUN PER DAY	SUGGESTED LUBRICATION PERIOD IN WEEKS BASED ON RPM						
	1-250	251-500	501-750	751-1000	1001-1500	2011-2500	2501-3000
8	12	12	10	7	5	3	2
16	12	7	5	4	2	1	1
24	10	5	3	2	1	1	1

DANGER

Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the installation manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Reliance Electrical Industrial Company nor are the responsibility of Reliance Electrical Industrial Co. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

CLEANING OF BLENDER

DANGER

Lock out all power sources prior to performing any maintenance procedures. Failure to obey this warning can result in severe bodily injury or death. Refer to the Lockout/ Tagout procedures in the safety section of this manual. (Section 2, page 22/23)

Once the unit has been properly disabled, the cover can be removed for cleaning. A mild detergent and warm water is acceptable for most applications.

The blender should, however, be cleaned with materials compatible with the product being processed.

The employer/owner is responsible for cleaning to be performed in a manner meeting the National Sanitation Foundation Standards.

The discharge valve, and gland assemblies, can now also be removed from the unit and cleaned.

Care should be taken when using water or liquids around the drive and bearings. Water entering these components can be hazardous (motor shorting, rusting of internal gears and bearings and/or bearing seizure can occur). When cleaning is completed, reassemble the unit making sure all fasteners are tight and the unit is empty. Power can then be restored to the mixer.

Consult with the supplier of raw materials being processed for material safety data sheets and the proper cleaning medium compatible with the product be processed before cleaning.

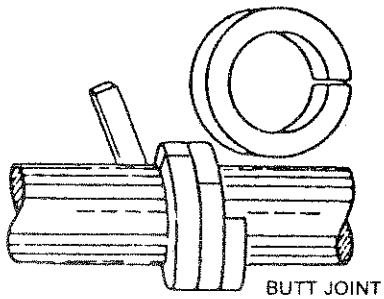
PACKING INSTRUCTIONS

DANGER

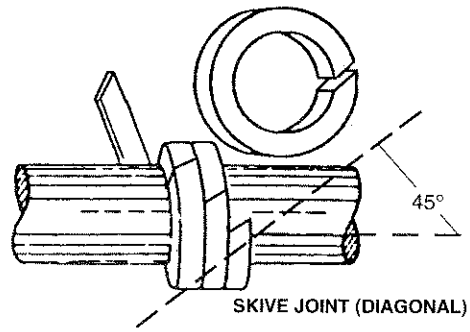
Prior to performing any maintenance procedures, make sure all power has been "locked out" as described in Section 2 of this manual. Failure to do so may result in serious injury or death.

This unit is supplied, at the factory, with packing material as a courtesy which may not be compatible with the product being processed. The packing supplied is a braided lubricated Teflon. Packing should be replaced by owner with proper packing material.

PACKING GLAND INSTRUCTIONS



BUTT JOINT



SKIVE JOINT (DIAGONAL)

The following standard packing instructions would apply to all glands including the Aaron Gland.

1. USE THE CORRECT CROSS SECTION OF PACKING OR DIE - FORMED RINGS. To determine the correct packing size, measure the diameter of the shaft (inside the stuffing box area if possible) and then measure the diameter of the stuffing box (to give the O.D. of the ring). Subtract the I.D. measurement from the O.D. measurement and divide by two. The result is the required size.

CUT ... DON'T WIND

2. WHEN USING CORAL OR SPIRAL PACKING, ALWAYS CUT THE PACKING INTO SEPARATE RINGS. Never wind a coil of packing into a stuffing box. Rings can be cut with butt (square), bias or diagonal joints, depending on the method used for cutting. The following illustration shows these methods of preparing bulk packing. The best way to cut packing rings is to cut them on a mandrel with the same diameter as the shaft in the stuffing box area. If there is no shaft wear, rings can be cut on the shaft outside the stuffing box.

Hold the packing tightly on the mandrel, but do not stretch excessively. Cut the ring and insert it into the stuffing box, making certain it fits the packing space properly. Each additional ring can be cut in the same manner, or the first ring can be used as a master from which the balance of the rings are cut.

If the butt joint rings are cut on a flat surface, be certain that the side of the master rings, and not the O.D. or I.D. surface, is laid on the rings to be cut. This is necessary so that the end of the rings can be reproduced.

When cutting diagonal joints, use a maple mitre board so that each successive ring can be cut at the correct angle.

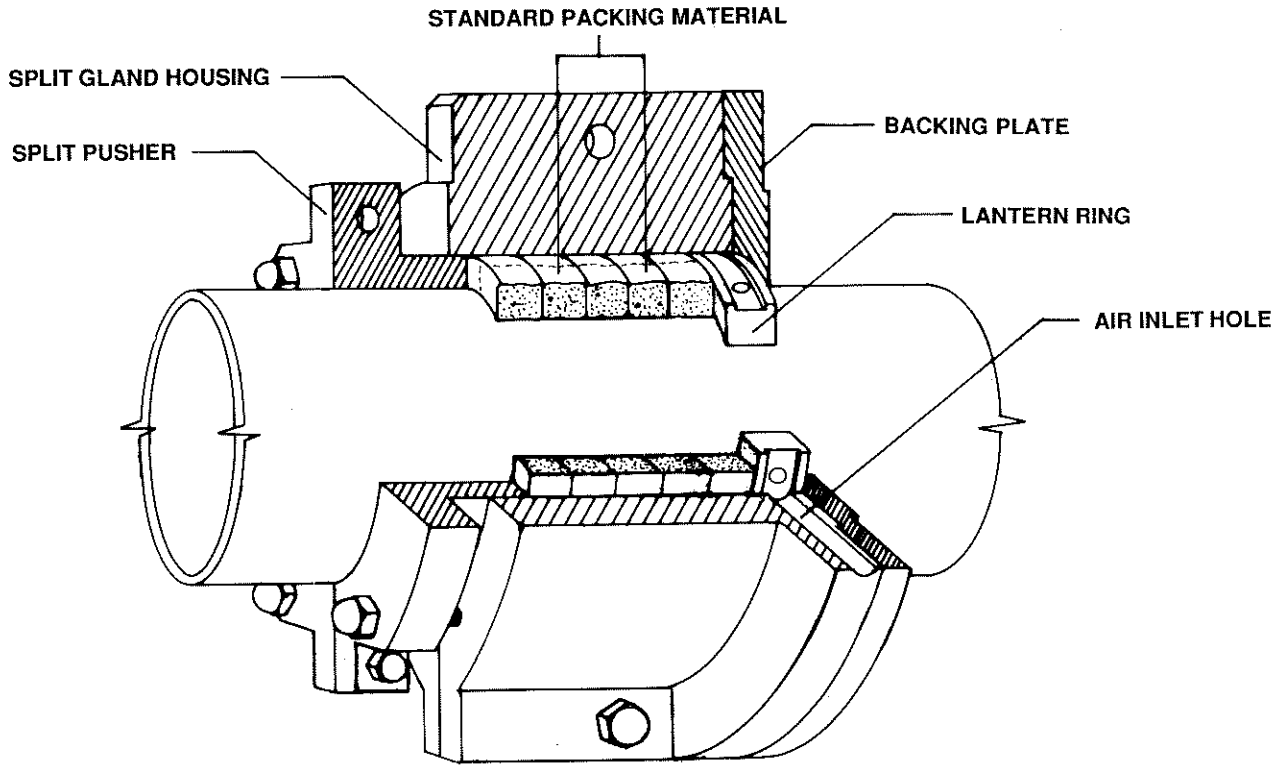
It is necessary that the rings be cut to the correct size. Otherwise, service life is reduced. This is where die-cut rings are of great advantage, as they give you the exact size ring for the I.D. of the shaft and the O.D. at the stuffing box. There is no waste due to incorrectly cut rings.

3. INSTALL ONE RING AT A TIME. Make sure it is clean, and has not picked up any dirt in handling. If desired, lubricate the shaft and the inside of the stuffing box.

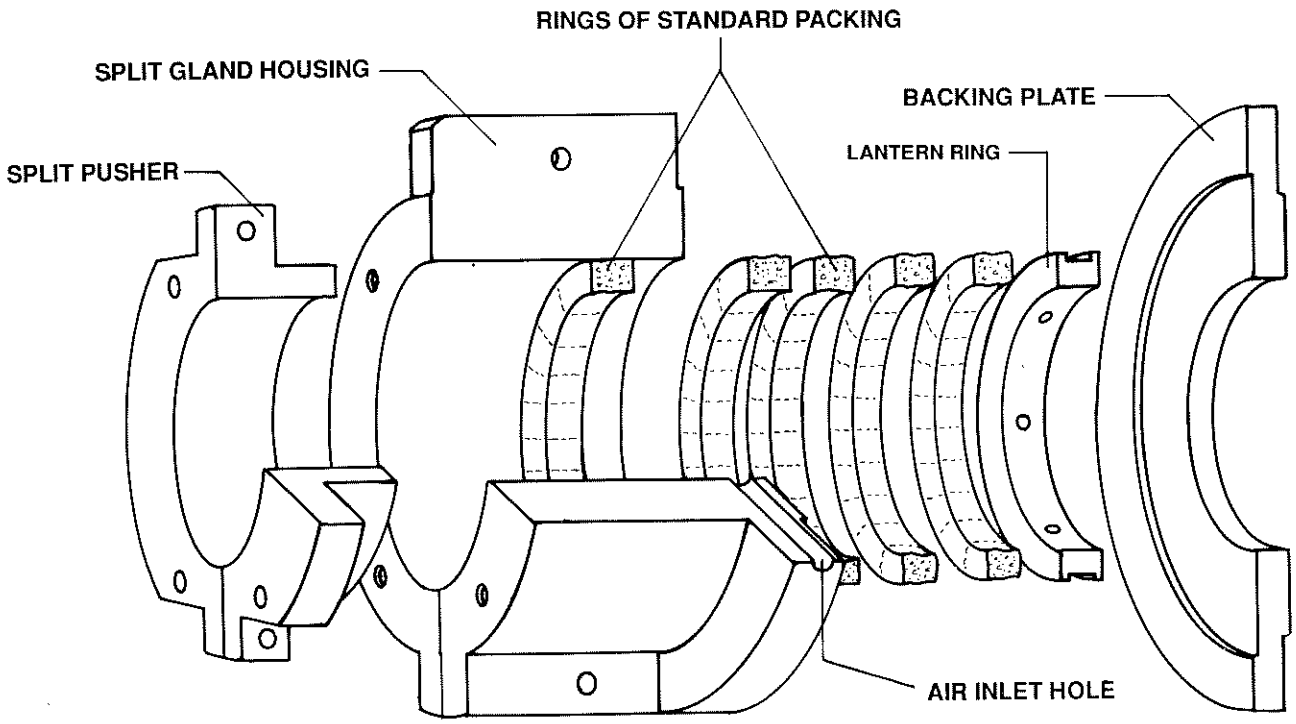
Seat rings firmly. Joints of successive rings should be staggered and kept at least 90º apart. Each individual ring should be firmly seated with a tamping tool. When enough rings have been individually seated so that the nose of the pusher will reach them. Individual tamping should be supplemented by the pusher.

4. AFTER THE LAST RING IS INSTALLED, take up bolts finger tight or slightly snugged up. Do not jam the packing into place by excessive gland loading. Start machine and take up bolts until leakage is decreased to a tolerable minimum. Make sure pusher bolts are taken up evenly.

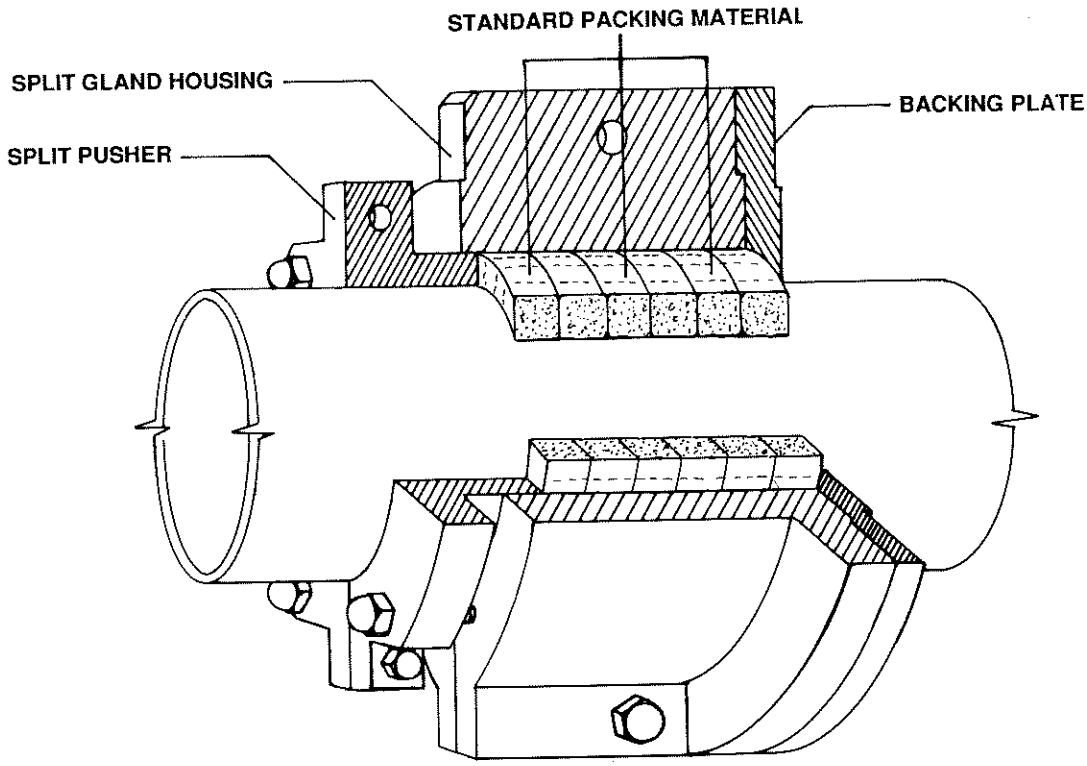
AARON AIR PACKING GLAND

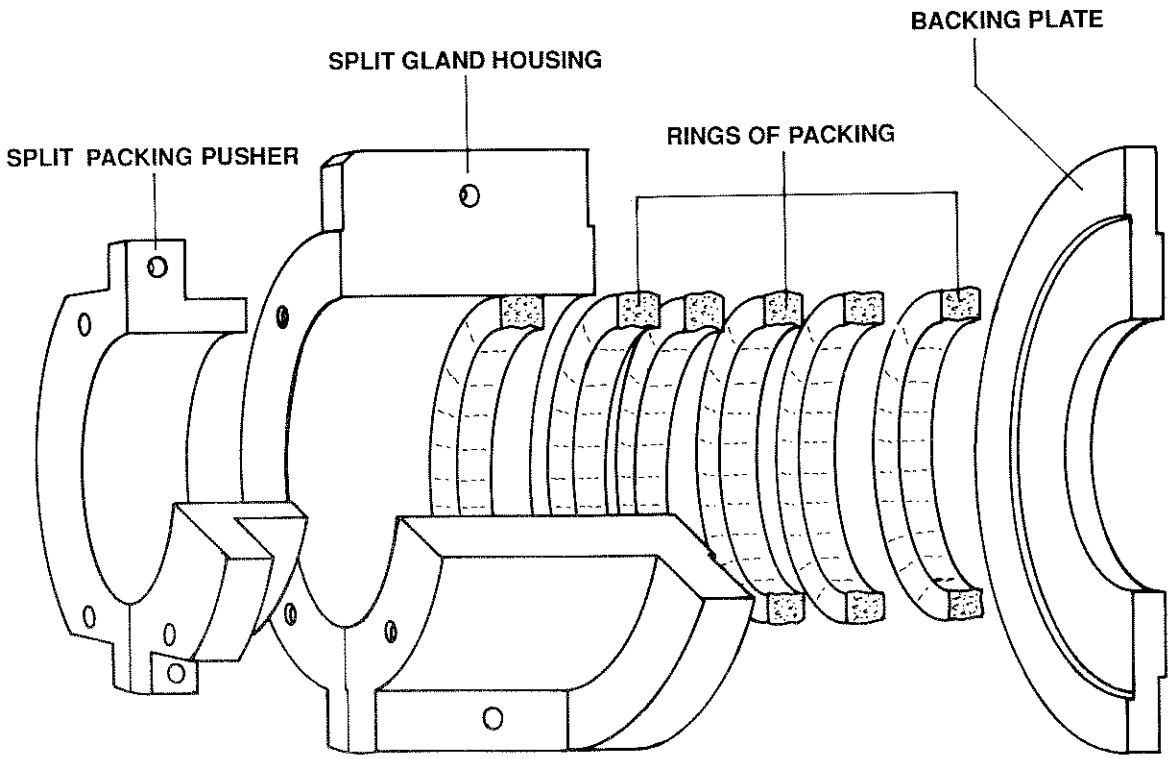


The purpose of the Lantern Ring is to prevent the product from getting inside the gland. This gland was developed primarily for sugar based products. By putting a positive air pressure on the Lantern Ring (3-5 lb./sq. inch) a constant flow of air comes out the inside and does not allow the product in.



AARON STANDARD PACKING GLAND





SPEED REDUCER INFORMATION

DANGER

To ensure maximum life and years of dependable service from the shaft mounted reducer, proper lubrication and levels must be maintained.

Consult the manufacturers manual on the specific model reducer in the component section of the manual for oil volumes and lubrication reccomendations.

Oil levels should be checked daily for the first 30 days of operation. After 30 days, the reducer must be drained and replenished with fresh oil. Use a high grade petroleum base, rust and oxidation inhibited (R & O) gear oil.

Oil levels can then be checked weekly and changed every 2500 hours or every 6 months, whichever occurs first.

PARTS LIST

Depending on the frequency of use, components of this blender can wear. (Normal wear and tear.) The following is a list of recommended spare parts that should be maintained in your parts room and replenished when used.

2 - Split back plate

2 - Gland housings

2 - Split pushers

2 - Support bearings

2 - Split lantern rings (if ordered with air purge seals)

2 - Split gland spacers

NOTE:

In some cases the split back plate and gland housings require the customer to drill out mounting holes by transferring the existing holes to the replacement parts.

When ordering, please specify:

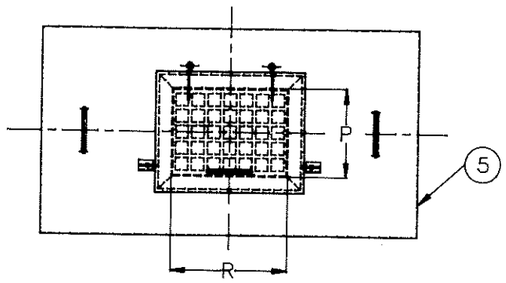
1. Company name
2. Serial number of blender

THE FOLLOWING CHARTS DEPICT STANDARD MODELS AVAILABLE. BECAUSE OF THE CONTINUING EFFORT TO IMPROVE OUR PRODUCTS, SIZES AND DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

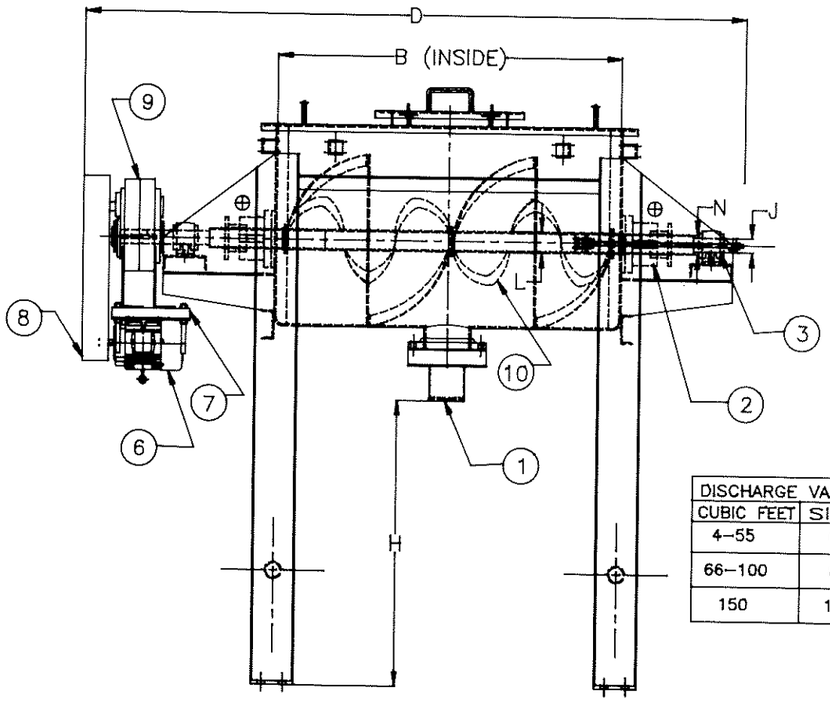
THE LOCATIONS AND PART NUMBERS OF SAFETY LABELS ARE ALSO NOTED ON THESE DRAWINGS. WHENEVER ONE OF THESE LABELS IS ACCIDENTLY MUTILATED, DESTROYED, OR COVERED, IT SHOULD BE REPLACED IMMEDIATELY. CALL AARON PROCESS FOR IMMEDIATE EXPEDITION OF THESE ITEMS. LABELS ARE AVAILABLE AT NO COST.

STANDARD BLENDER SIZES

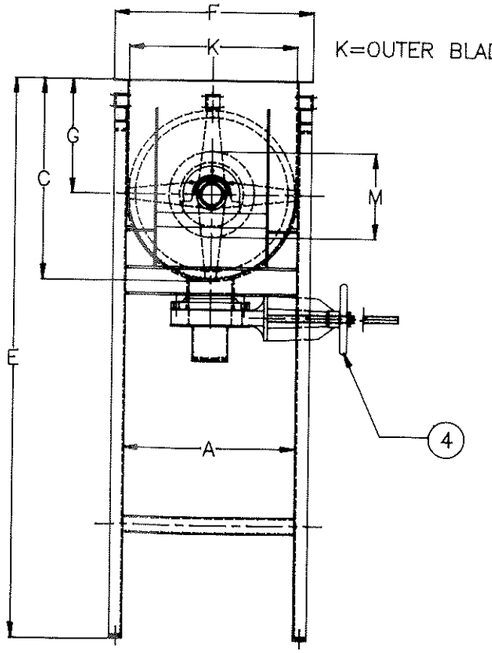
COVER HATCH OPENING SIZE			
CU.FT	P	R	QTY.
4	9	12	1
14	12	16	1
24	13	22	1
36	14	25	1
55	17	30	1
66	17	30	1
80	20	32	1
100	20	20	2
150	20	20	2



CU.FT.	GAL.	A	B	C	D	E	F	G	H	J	K	L	M	N
4	30	18	24	22	55	46	20	13	14	1–15/16	17–1/2	2–3/8	9	2–1/4
14	105	24	48	28	91	76	28	16	38	1–15/16	23–1/2	2–1/2	12	2–3/4
24	180	26	66	30	110	78	30	17	38	2–15/16	25–1/2	3	13	3–7/16
36	270	30	78	34	122	82	34	19	38	3	27–1/2	4	15	3–7/16
55	410	34	90	39	134	87	38	22	38	3–7/16	33–1/2	6	17	4–7/16
66	470	36	96	41	154	89	41	23	38	3–15/16	35–1/2	6	18	4–7/16
80	600	40	96	48	154	96	44	28	38	3–15/16	39–1/2	6	20	4–15/16
100	750	48	96	54	152	102	52	30	38	4–7/16	47–1/2	8	24	5–7/16
150	1125	48	144	54	202	102	52	30	38	4–15/16	47–1/2	8	24	5–7/16



DISCHARGE VALVE	
CUBIC FEET	SIZE
4–55	6"
66–100	8"
150	10"



DET.	DESCRIPTION
1	VALVE GUARD
2	GLAND ASSEMBLY
3	SUPPORT BEARING
4	DISCHARGE VALVE
5	TOP COVER
6	MOTOR
7	MOTOR MOUNT
8	BELT GUARD
9	TRANSMISSION
10	AGITATOR

SAFETY LABEL LOCATIONS

PART#	DESCRIPTION	LOCATION
1001	OPERATIONAL SAFETY	TOP COVER NEAR HATCH
1002	MAINTENANCE SAFETY	EACH END OF BLENDER
1003	DANGER (ROTATING)	ON BELT GUARD
1004	DANGER (DISCHARGE)	EACH SIDE OF DISCHARGE VALVE
1006	SAFETY	ON BELT GUARD
1008	NOTICE	ON BELT GUARD