



VERTICAL BALER

OPERATOR/SERVICE MANUAL

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June 2007
OSM 101200

FOREWORD

This manual was prepared to enhance the utilization of Harris Vertical Balers. The intention is to provide clear, easy-to-use guidelines for safe operation of the machine.

In order for this manual to be effective, the owner and operator must read and understand all of the information. Extra attention must be given to safety precautions before attempting to operate or service the baler.

Each Harris baler is pre assembled and factory-tested to ensure it operates and performs to its design standards.

If the customer or operator should encounter any problems with the baler, or if any questions arise regarding the baler's operation or capabilities, please contact HARRIS WASTE MANAGEMENT GROUP, INC. Service Department (800)-447-3526.

Using nonstandard parts may adversely affect the operation, performance, and safety of Harris machines and may void the warranty. To protect investments and ensure safe operation, insist on genuine Harris replacement parts and components for all Harris equipment.



The information contained herein refers to U.S. OSHA and ANSI standards. Please use applicable codes, standards, and directives specific to your country.

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SECTION 1 - SAFETY & EQUIPMENT INFORMATION

OWNER/EMPLOYER RESPONSIBILITIES

Owner/Employer safety responsibilities are contained in ANSI Z245.5 Baling Equipment - Safety Requirements for Installation, Maintenance and Operation, Section 7 and 8. **It is very important for the safety of employees that the owner/employer complies with these requirements.** A copy of ANSI Z245.5 is appended to this manual for reference.

Owner/employer responsibilities are also contained in 29 CFR 1910 Occupational Safety and Health Standards. These standards include but are not limited to:

General Requirements

Section 5 (a)(1) of the OSHA act, often referred to as the General Duty Clause, requires employers to “furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees”. Section 5 (a)(2) requires employers to “comply with occupational safety and health standards promulgated under this Act”.

Hazard Assessment

1910.132(d)(1) The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall:

1910.132(d)(1)(i) Select, and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;

1910.132(d)(1)(ii) Communicate selection decisions to each affected employee; and,

1910.132(d)(1)(iii) Select PPE that properly fits each affected employee. Note: Non-mandatory Appendix B contains an example of procedures that would comply with the requirement for a hazards assessment.

1910.132(d)(2) The employer shall verify that the require workplace hazards assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment.

Working at Elevated Heights

The owner/employer is responsible for providing an OSHA compliant working surface for clearing material jams in the hopper. Never use feed conveyors to access the hopper. Always use an OSHA compliant work surface or platform to access the hopper to clear material jams.

1910 Subpart D, Walking-working surfaces

1910.23, Guarding floor and wall openings and holes

1910 Subpart F, Powered platforms, manlifts, and vehicle-mounted work platforms

1910.66, Powered platforms for building maintenance

Appendix A, Guidelines (Advisory)

Appendix C, Personal fall arrest system (Section I - Mandatory; Sections II and III - Non-mandatory)

Lockout/tagout

1910.147 - The control of hazardous energy (lockout/tagout)

1910.147 App A - Typical minimal lockout procedures

Confined Space Entry

1910.146 - Permit-required confined spaces

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

INTRODUCTION

Before operating the Harris Vertical Baler, it is the operator's and owner's responsibility to have a clear understanding of how the machine functions and to be aware of all the necessary precautions for safe operation. If there are any questions regarding operating procedures or safety precautions, contact HARRIS WASTE MANAGEMENT GROUP, INC., referenced as HARRIS throughout this manual, Service Department (800)-447-3526, to ensure that all precautions are taken before proceeding. Harris balers are capable of compressing and baling various materials. The Harris baler is not intended for baling ferrous metals, concrete, or other large, high-density materials. The baler operator must know and observe the capacities and limitations of the machine, be alert at all times, and watch for conditions that may affect normal machine performance or create an unsafe condition in the work area. If necessary, shut the machine down following the prescribed shut-down procedures. Use the emergency stop button in the event of an emergency and notify the proper authorities immediately. Corrective measures, service, or baler repair must be performed only by trained, authorized personnel who are thoroughly familiar with the equipment, safety features, precautions, and instructions. If at any time there is a question regarding safety, consult this manual or Harris Service Department to ensure all precautions are taken before proceeding.

The Harris Vertical baler is capable of compressing a great number of materials into bales and is designed with major emphasis on safety. However, as with any industrial machine capable of applying extreme force through hydraulic pressure, the baler can cause serious injury or death if used in an unsafe manner. It is very important to keep an alert, conscientious attitude and observe safe operating procedures to prevent accidents.

WARNING TERMS

The terms **DANGER**, **WARNING**, **CAUTION**, and **NOTE** appear throughout this manual and on safety warning signs. They denote the following:



The word **DANGER** precedes information dealing with specific, immediate hazards which, if disregarded, **WILL** result in **SEVERE INJURY** or **DEATH** to the user or others.



The word **WARNING** precedes information dealing with hazards or unsafe practices which **COULD** result in **PERSONAL INJURY** or **DEATH** to the user or others.



The word **CAUTION** precedes information dealing with potential hazards or unsafe practices which, if disregarded, **MAY RESULT** in **PERSONAL INJURY** or **DAMAGE to the equipment**.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

NOTE

The word **NOTE** precedes information which is vital to the proper operation or maintenance of the equipment.

Make certain warning decals are obeyed at all times.

Make certain warning decals are in place and legible at all times. A warning decal location chart is provided on page **Z** in this manual to assist in checking for warning decals.

Report any damaged or missing warning decals to the proper authorities immediately.

Replacement warning decals can be ordered free of charge from Harris or local distributors.

The health and safety of personnel must be considered when operating a baler. Care must also be taken when maintenance is performed.



Ensure that the power source is isolated and the machine is locked-out and tagged out in accordance with OSHA 29 CFR 1910.147 and ANSI/ ASEE Z244.1-2003 regulations before entering machine or attempting any service or maintenance including clearing material blockages and jams.



Never perform any operation unless all guards are in place and safety interlock devices are fully functional.



Never place any part of the body in a potential pinch point. Never enter the baler at any point to perform service work (including clearing major and minor jams), unless the baler is shut down and locked-out/tagged out in accordance with OSHA standards.



Always perform lockout/tagout procedures when clearing material jams. Always access the baler in accordance with OSHA requirements.



Severe injury or death can result from ignoring these safety precautions.

NOTE

Only trained, authorized personnel familiar with safe operating and maintenance procedures are allowed to inspect, operate, or service the baler.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

SAFETY PRECAUTIONS

- Obey all warning decals.
- Always wear proper hand and eye protection when tying a bale.
- Be certain all safety guards and access doors are maintained and secured in place while the machine is in operation.
- Do NOT slam the safety gate.
- Before operating the machine, make certain all warning signals and interlock devices are working.
- Be alert and aware of all persons working in the vicinity of the baler.
- Be alert and aware of those operating conditions that can adversely affect the operation of the baler.
- Know emergency shutdown procedures and where to get help in the event of an emergency.
- Never attempt to operate any equipment, or perform service or maintenance without the proper training.
- Never operate the baler while under the influence of intoxicants, narcotics, or drugs that impair judgement. Working under the influence of intoxicants or narcotics presents a major hazard to the operator and others in the work area.
- Never operate the baler while wearing jewelry or loose clothing which may catch on moving parts or controls.
- Always wear proper safety equipment as specified by the employer. Harris strongly recommends head, eye, and foot protection and, in noisy installations, hearing protection.
- Do not start or operate equipment which has a malfunction.
- Never remove covers on any electrical component, unless the main electrical power supply is off and secured with a padlock. Make sure the machine is locked-out/tagged-out in accordance with OSHA regulations before any service or maintenance is attempted.
- Know the location and function of all emergency stop buttons, control switches, instruments, gauges, and protection devices.
- Know the location of all fire extinguishers and make sure they are fully charged and maintained, and workers are trained to use them.
- Make certain all persons are clear of the baler, conveyors, and other related equipment before starting the machine.

Publication of these safety precautions does not imply or in any way represent an all inclusive list. It is the owner's and operator's responsibility to be familiar with all safety requirements and ensure that the operation of the unit is in accordance with safety requirements and codes, including all applicable Occupational Safety and Health Act (OSHA) and American National Standards Institute (ANSI) regulations, as well as other state and local codes. These regulations and codes change. It is strongly recommended that current applicable OSHA and ANSI standards be available to the operators at all times.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

HYDRAULIC SYSTEM



Any service or maintenance to the hydraulic system must only be performed by trained, authorized personnel and only after the machine is locked-out/tagged-out in accordance with OSHA regulations.



Never use hands to check for hydraulic fluid leaks. Hydraulic fluids escaping under high pressure may cause severe injury. In the event of an injury, seek medical treatment immediately.

ELECTRICAL SYSTEM



Any service or maintenance to the electrical system must only be performed by trained authorized personnel and only after the machine is locked-out/tagged-out in accordance with OSHA regulations.

HARRIS balers require a high voltage external power supply. Each unit has two electrical circuits: a main power circuit, and a 120-volt circuit. The high voltage furnishes power to operate the motors, and a transformer converts the high voltage to 120 volts to operate the control power circuit, programmable logic controller (PLC), and operator's control panel.

For the main power circuit, high voltage enters the main electrical control panel and goes directly to the drive motors.

For the control power circuit, high voltage enters the main electrical control panel and goes to a transformer where the electrical power is converted to 120 volts. The control power circuit consists of control buttons on the operator's control panel, limit switches, proximity switches, relays, timers, and solenoid valves. These switches and valves control the baler.

The operator's control panel is powered by 120 volts supplied from the transformer in the main electrical panel.

For the electrical system to function properly, electrical components must be kept clean and dry, (i.e., free from dirt and moisture).

In order for the baler to operate properly, all limit switches and proximity switches must be properly adjusted and free from foreign materials to prevent the switches from giving false signals to the control circuit.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

PROPER LOCKOUT/TAGOUT

According to the OSHA 29 CFR 1910.147, all personnel are to be instructed to perform proper lockout/tagout procedures on the machines they operate. Please thoroughly review Appendix A of this manual for this procedure.



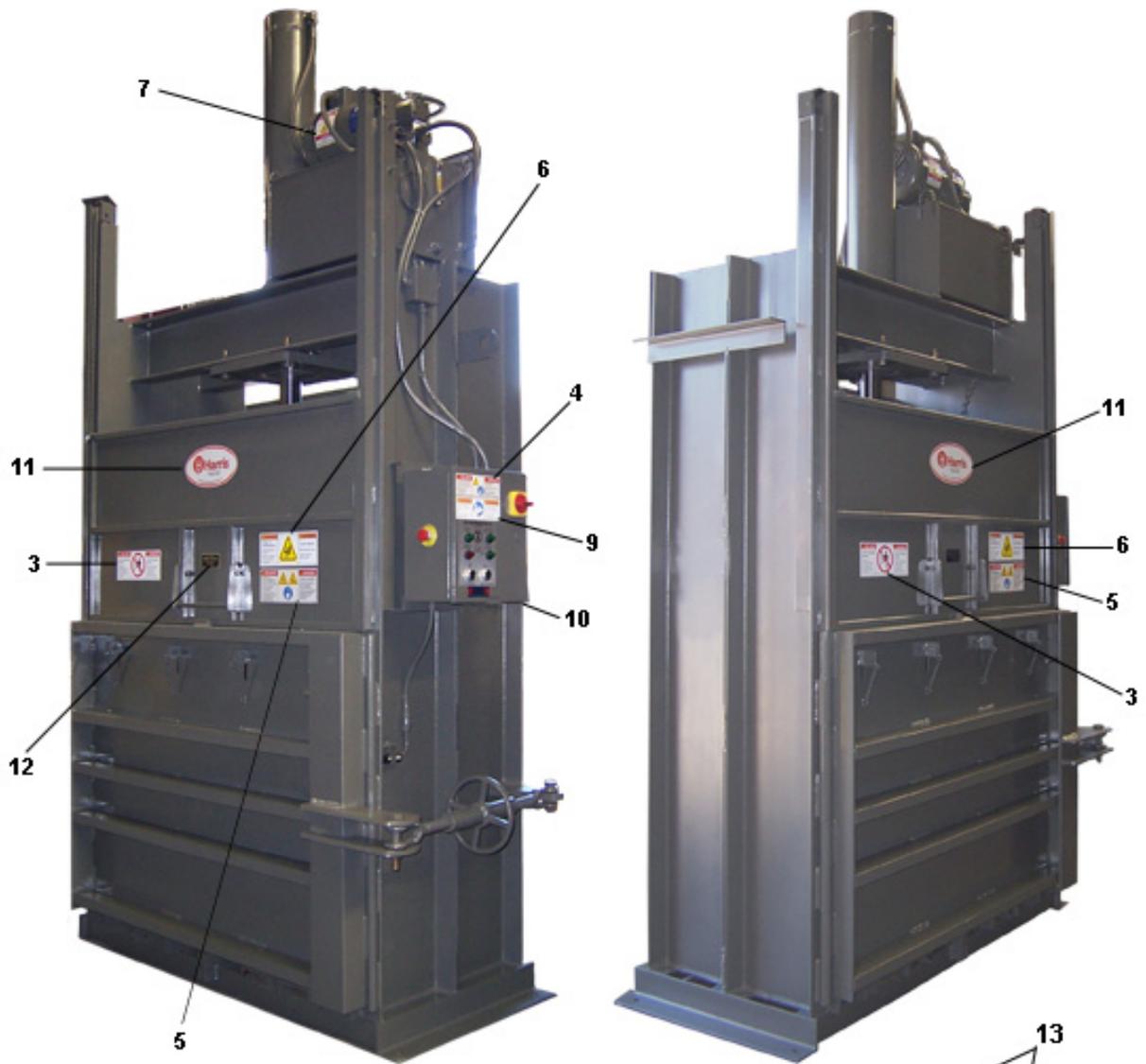
SAFETY WARNING SIGNS

1. OPERATING INSTRUCTIONS
2. SAFETY INSTRUCTIONS
3. DANGER - Confined Space Entry.
4. DANGER - Hazardous Voltage, contact will cause electric shock.
5. DANGER - Crush Hazard. Keep all body parts out of machine.
6. WARNING - Bale Ejection Area, keep clear.
7. DANGER - High Voltage, Risk of Electrical Shock.
8. WARNING - Three Phase Electrical (Inside Main Power Panel).
9. WARNING- Operating and Service Manual Instructions.
10. Made in America.
11. Harris Oval Decal.
12. ANSI Certification Decal.
13. DANGER - Crush Hazard Keep all body parts out of machine.

All warning decals must be followed at all times.

Make certain warning signs are obeyed at all times. Ensure warning signs are in place and readable at all times. A warning sign location chart is provided on page 7 in this manual. Report any damaged or missing warning signs to the proper authorities immediately. Replacement warning signs can be ordered free of charge from your local distributor or from HARRIS WASTE MANAGEMENT GROUP, INC., 100 Jekyll Road, Baxley, GA, 31513.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION



SECTION 1 - SAFETY & EQUIPMENT INFORMATION

OPERATING INSTRUCTIONS

1. BE SURE BALE REMOVAL CHAIN AT REAR OF BALER IS UNHOOKED FROM PLATEN.
 2. BE SURE THAT BALE REMOVAL DOOR IS CLOSED AND PROPERLY LATCHED.
 3. LOAD MATERIAL TO BE BALE INTO BALING CHAMBER. PULL SAFETY GATE ALL THE WAY DOWN INTO ITS CORRECT POSITION. THEN PRESS THE "DOWN" BUTTON. BALER WILL CYCLE AND SWITCH OFF AUTOMATICALLY IN THE UP POSITION.
 4. REPEAT STEPS No. 3 UNTIL BALE IS COMPLETED AND BALER SWITCHES OFF IN DOWN POSITION.
NOTE: INDICATOR LIGHT ON CONTROL PANEL INDICATES THAT BALE IS COMPLETE.
NOTE: BALER WILL NOT RUN AUTOMATICALLY UNLESS BALE REMOVAL DOOR IS CLOSED AND LATCHED AND SAFETY GATE IS ALL THE WAY DOWN IN ITS CORRECT POSITION.
IF SAFETY GATE IS RAISED FASTER THAN RAM IS MOVING UP THE BALER WILL SHUT DOWN.
WARNING: NEVER ATTEMPT ANY CLEANING OR ADJUSTMENTS TO THE BALER WITHOUT LOCKING OUT THE POWER TO THE BALER
 5. TO REMOVE BALE:
 - A. OPEN BALE REMOVAL DOOR WITH GRADUAL TENSION, RELEASE LATCH.
 - B. INSERT (4) TIE WIRES THROUGH SLOTS IN FLOOR AROUND BALE AND BACK THROUGH SLOTS IN RAM. TIE WIRES SECURELY.
 - C. INSERT BALE REMOVAL HOOK ONTO PLATEN (CATCH PROVIDED ON REAR OF PLATEN).
 - D. PLACE BALE DOLLY IN FRONT OF BALER. PULL SAFETY GATE ALL THE WAY DOWN INTO ITS CORRECT POSITION. THEN PUSH AND HOLD "UP" BUTTON ON CONTROL PANEL. BALE SHOULD ROLL OUT.
 - E. PULL SAFETY GATE ALL THE WAY DOWN INTO CORRECT POSITION, CLOSE, AND LATCH MAIN DOOR. THEN PUSH "DOWN" BUTTON. WHEN PLATEN REACHES LOWEST POSITION, THE EJECTION CHAIN AND HOOK WILL UNHOOK AUTOMATICALLY. THE PLATEN SHOULD REVERSE AND BALER WILL CONTINUE ITS CYCLE, SWITCHING OFF AUTOMATICALLY IN THE UP POSITION, READY FOR LOADING OF MATERIAL
- MEETS ALL Z245.5 ANSI STANDARDS.

1.

INSTRUCCIONES DE SEGURIDAD

1. La operación de esta máquina deberá estar a cargo de personal capacitado familiarizado con los procedimientos de operación y mantenimiento.
2. Use siempre el equipo de seguridad adecuado.
3. Conozca la ubicación de todas las llaves de interrupción de emergencia.
4. Jamás realice procedimientos de mantenimiento o servicio sin apagar la máquina y anular las fuentes de electricidad.
5. Antes de hacerla funcionar, asegúrese de que todos los dispositivos de advertencia y de bloqueo funcionen.
6. No opere la máquina si se han retirado los resguardos de seguridad o las llaves de seguridad están defectuosas.
7. Preste atención a todos los dispositivos y etiquetas de advertencia.
8. Jamás coloque su cabeza, extremidades ni ninguna otra parte de su cuerpo en un punto de la máquina donde puedan estrujarse.
9. Sepa dónde está ubicado todo el personal y advierta a todos antes de ponerla en funcionamiento.
10. Sepa dónde conseguir ayuda en caso de una emergencia.
11. Si tiene alguna pregunta respecto de los procedimientos seguros de operación y mantenimiento de esta máquina, consulte al HARRIS SERVICE DEPT.

SAFETY INSTRUCTIONS

1. This machine must be operated only by trained personnel familiar with the safe operating and maintenance procedures.
2. Wear the proper safety equipment.
3. Know the location of all emergency stop switches.
4. Never perform any maintenance or service without properly shutting down machine and locking out all energy sources.
5. Make certain all warning and interlock devices are working before operating machine.
6. Never operate this machine with safety guards removed or safety switches defective.
7. Obey all warning devices and labels.
8. Never place your head, limbs or any other body parts in a potential pinch point.
9. Know the location of all personnel and warn prior to starting machine.
10. Know where to get help in the event of an emergency.
11. If you have any questions regarding the safe operation or maintenance of this machine contact the HARRIS SERVICE DEPT.

2.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

⚠ PELIGRO		⚠ DANGER
Evitar lesiones graves. Seguir los procedimientos para espacios reducidos antes de entrar.		Avoid serious injury. Follow confined space entry procedures before entering.

3.

⚠ ADVERTENCIA		⚠ WARNING
Leer y comprender todas las instrucciones de los manuales de servicio y del operario antes de operar o dar servicio a esta máquina. Antes de dar servicio a la máquina, seguir el procedimiento de bloqueo/etiquetado.		Read and understand all operator/service manual instructions before operating or servicing this machine. Follow lockout/tagout procedure before servicing machine.

9.

⚠ PELIGRO		⚠ DANGER
VOLTAJE PELIGROSO. El contacto puede causar una descarga eléctrica o quemaduras. Antes de dar servicio o mantenimiento, seguir el procedimiento de bloqueo/etiquetado.		HAZARDOUS VOLTAGE. Contact will cause electric shock or burn. Follow lockout/tagout procedure before maintenance or servicing.

4.



10.

⚠ PELIGRO		⚠ DANGER
RIESGO DE APLASTAMIENTO. Mantener todas las partes del cuerpo fuera de la máquina durante el funcionamiento. Antes de dar servicio o mantenimiento, seguir el procedimiento de bloqueo/etiquetado.		CRUSH HAZARD. Keep all body parts out of machine during operation. Follow lockout/tagout procedure before maintenance or servicing.

5.



11.

⚠ ADVERTENCIA		⚠ WARNING
Riesgo de aplastamiento. Área de eyección de balas. Mantener alejadas todas las partes del cuerpo.		Crush hazard. Bale ejection area. Keep all body parts clear.

6.



12.

⚠ DANGER
High Voltage. Risk of electrical shock.

⚠ PELIGRO
Voltaje Alto. Riesgo de descarga eléctrica.

7.

⚠ ADVERTENCIA		⚠ WARNING
Voltaje peligroso. Trifásico.		Hazardous voltage. Three Phase.

8.

⚠ DANGER
CRUSH HAZARD. Keep all body parts out of machine during operation. Follow lockout/tagout procedure before maintenance or servicing.

⚠ PELIGRO
RIESGO DE APLASTAMIENTO. Mantener todas las partes del cuerpo fuera de la máquina durante el funcionamiento. Antes de dar servicio o mantenimiento, seguir el procedimiento de bloqueo/etiquetado.

13.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

MATERIALS PROCESSED

Baling materials should consist only of those specifically approved by HARRIS WASTE MANAGEMENT GROUP, INC. with written specifications. Other materials may damage the machine by point loading, severe abrasion, extreme impacting, etc. Processing materials which are not covered by the list below will be considered an abuse of the machine. Machine abuse WILL VOID THE WARRANTY.



ACCEPTABLE MATERIALS

MATERIAL	V5-HD	V5-XHD	V5-XHDP	VNF-5	V6
High Grade Paper, if Segregated and Delumped				X	
Bulk or Shredded Corrugated Paper	X	X	X	X	X
Conditioned Newsprint		X	X	X	
Whole Aluminum Cans		X	X	X	
Perforated PET			X		

UNACCEPTABLE MATERIALS

- Masonry, steel, or other such noncompressibles.
- Pressurized cylinders and cans of any description.
- Solid Waste.

Glass, masonry, and other such abrasive noncompressibles can cause excessive wear or damage and can interfere with baler functions.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

LOCATION OF MAJOR COMPONENTS



SECTION 1 - SAFETY & EQUIPMENT INFORMATION

DESCRIPTION OF MAJOR COMPONENTS

MAIN RAM (PLATEN) CYLINDER

The main ram (platen) cylinder is controlled by a solenoid-operated directional valve through a microprocessor controller, which places the main ram (platen) into the appropriate operating mode.

ELECTRIC MOTOR

The electric motor is supplied with the appropriate voltage to drive the hydraulic pump. The horsepower rating of the electric motor is dependent upon the power unit option chosen. The electric motor is mounted on top of the hydraulic tank.

HYDRAULIC PUMP

The hydraulic pump is mounted onto the electric motor. The pump provides the flow and pressure required to operate the main ram cylinder.

CONTROL VALVE BLOCK ASSEMBLY

The valve block assembly consists of solenoid-operated pilot-controlled spool valves. The valve block assembly is mounted on top of the hydraulic tank.

HYDRAULIC TANK

Hydraulic fluid operates under high temperatures. Avoid contact with piping, hoses or cylinders to prevent the possibility of burns. The hydraulic tank is a welded steel tank. The volume of the tank depends upon the power unit. The tank is equipped with a sight gauge/temperature gauge located on the side of the tank.



Never use hands to check for hydraulic fluid leaks. Fluid escaping under pressure could cause severe injury. In the event of injury, seek medical treatment immediately.

PLATEN

The platen is a compression plate structure that is securely fastened to the main ram cylinder. The platen extends through the chamber into the bale compression chamber where the bale is formed by pressure placed on it by the platen.

SECTION 1 - SAFETY & EQUIPMENT INFORMATION

BALER FUNCTIONS

LOADING

Material is loaded into the baler while both the platen and safety gate are in the UP position. Do NOT attempt to load material into the baler unless both the platen and safety gate are in the up position.

COMPACTION

With the safety gate in the down position, the platen pushes the material down into the bottom of the baling chamber and bale dogs help hold material down while the platen returns to the UP position. As the platen moves up to the loading position, the safety gate will automatically rise.

EJECTION

After a bale has been created, baler functions will stop and the “bale complete” light will illuminate. The following steps should be followed to correctly eject a bale from the machine:

1. Open the bale door.
2. Place straps or bands on the bale.
3. Connect the ejector hook to the platen.
4. Use the manual “UP” pushbutton to eject the bale. (The bale eject paddle ejects the bale while the platen is raised using the manual “UP” pushbutton.)

SECTION 2 - OPERATION

PRE-OPERATION INSPECTION

A pre-operation inspection is essential for the safe and efficient operation of the Vertical baler. It should only be completed by trained personnel familiar with safe operating procedures. While items listed are standard, there may be other checks required for some baler installations.



Before performing pre-operation inspections, ensure the baler has been shut down and locked out/tagged out in accordance with OSHA standards.

1. Working area around baler:
Keep clean.
Remove flammable materials.
Remove any oil or fluid spills.
2. Before operating, check around platen for material build-up; clean out if necessary.
3. Check hydraulic lines, hoses, and fittings for fluid leaks.
4. Look for worn, broken and damaged parts such as:
Hydraulic hoses.
Broken or missing cap screws and pins.
Wear Strips.
Welds (broken or cracked).
Structural damage.
5. All warning decals, safety guards and interlock switches must be in place and functional.



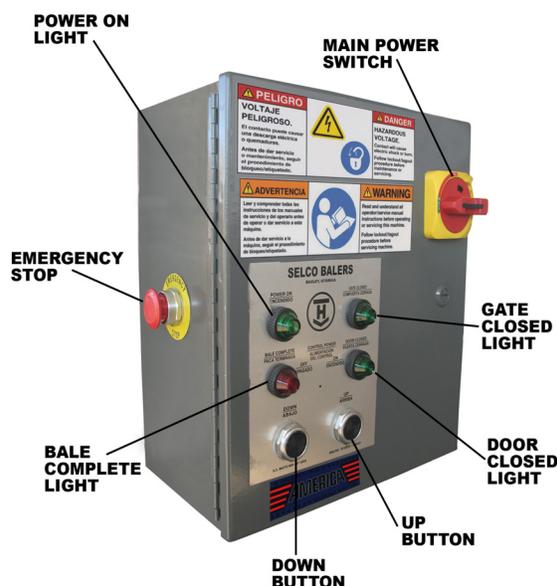
Never override a safety interlock switch. Ensure all guards are in place prior to operation.

6. Make sure all electrical panels are closed and secure.
7. Check hydraulic reservoir oil level, add the correct fluid, if necessary.
8. Ensure that the main power supply is on.
9. Ensure bale discharge area is not obstructed.
10. Make certain lighting is adequate for safe operation. All parts of the machine should be visible during pre-operation inspection.
11. Note the position of fire extinguishers and make sure they are fully charged. Have emergency telephone numbers available.

DESCRIPTION OF OPERATING CONTROLS

NOTE

The following information is for descriptive purposes only. The intent is to aid the operator with locating controls and provide a description of each control. It is not to be misconstrued as operating instructions. For proper operating instructions, refer to OPERATING PROCEDURES later in this section.



MAIN POWER SWITCH

Regulates the electrical supply to the baler control panel. The baler will not operate while the switch is in the "OFF" position.

EMERGENCY STOP BUTTON

(Located on operators control console) This button, when depressed, stops all operating functions and shuts the machine down in the event of an emergency. The unit will not operate with this button depressed.

NOTE

There may be remote emergency stop buttons located on other parts of the machine.

SECTION 2 - OPERATION

REMOTE STOP SWITCH (if applicable)

(Located away from the machine at a location selected by the owner.) This switch shuts down the machine and prevents unit start up from a remote location. If desired, the switch may be locked in the off position for safety purposes.

DOOR CLOSED LIGHT

An illuminated green light indicates the bale door is closed and secure.

NOTE

Baler will not cycle unless door is closed and light is on.

DOWN BUTTON

When this black button is pressed, the platen cycle will start.

Power On, Gate Closed and Door Closed lights must be on for the Down Button to operate.

UP BUTTON

When pressed, the up button raises the platen to the up/loading position. The power on light must be on and the button held down for the machine to operate.

NOTE

In order for the following lights to illuminate, the Up Button must be depressed:

POWER LIGHT

A green light indicates the main power switch is in the "on" position.

BALE COMPLETE LIGHT

A red light indicates a complete bale is formed and ready for banding and ejection.

GATE CLOSED LIGHT

A green light indicates the safety gate is closed and secure and the baler is ready to cycle.

NOTE

Baler will not cycle unless the light is illuminated and the gate is closed.

BALER DAILY INSPECTION

The following inspection is essential for safety as well as operating efficiency for Harris Vertical Balers. Performing daily inspections should aid in the

prevention of operational problems and help prolong the life of the machine.

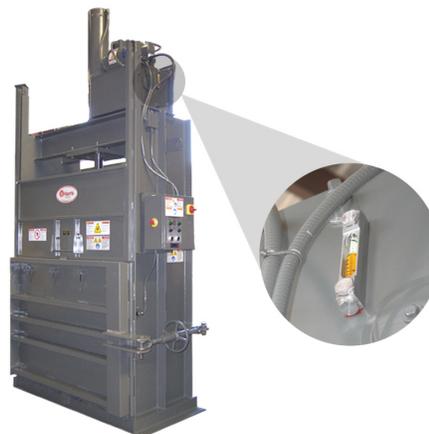
ITEMS TO INSPECT AND CHECK

1. Area under and around the Baler:
 - Keep clean
 - Remove all flammable materials
2. Check hydraulic lines and connections for oil leaks.



Do not use hands to check for hydraulic fluid leaks. Fluid escaping under pressure may cause severe injury.

3. Hydraulic Oil Reservoir fluid level, add correct amount and type fluid if necessary.



4. Look for worn or broken parts:
 - Hydraulic hoses
 - Missing bolts
 - Platen guides
 - Welds
5. All warning signs, safety shields, and guards must be in place.
6. Make sure electrical panels are closed and secure.
7. Note the position of nearest fire extinguisher. Make sure it is charged.
8. Make sure a current operators manual is available.
9. Have emergency telephone numbers available.
10. Start and cycle the baler as described in the operation section of this manual. Make sure all

SECTION 2 - OPERATION

safety guards and interlock switches work correctly.

11. Immediately report any malfunction or irregularity to the proper authority.



PRIOR TO OPERATION

- Do not operate baler while wearing jewelry or loose clothing which may catch on moving parts or controls.
- Always wear proper safety equipment as specified by the employer. Harris recommends gloves, eye protection, foot protection, and in noisy installations, hearing protection.
- Never operate baler while under the influence of intoxicants or narcotics. Workers under the influence of intoxicants or narcotics present an immediate hazard to themselves and others.
- Ensure Bale Eject Hook is removed from platen.
- Safely test the machine. Ensure that raising the safety gate while the platen is moving down terminates all baler functions.

It is the owner/operator's responsibility to ensure that the baler operation is in accordance with the guidelines in this manual and all applicable codes including OSHA and ANSI regulations.

Never attempt to operate or perform maintenance on this machine or any other equipment without the proper training.

Know the location and function of all controls, switches, gauges, and protective devices. Ensure all function as they should.

OPERATION

12. Make sure Bale ejector hook has been removed from platen.



GUARD REMOVED FOR CLARITY

NOTE

Lights will illuminate after the down button is depressed. If the down button is depressed and the cycle does not start, check Door Closed and Gate Closed lights.

13. Be sure the bale door is closed and properly secured.
14. Turn main power on.
Power On, Door Closed, Gate Closed Lights should be on.
15. Raise platen and safety gate to Up/Loading position by depressing and holding the UP button.
16. Load material into the baler. Ensure there is no material sticking out over the bale door.
17. Close the safety gate.

NOTE

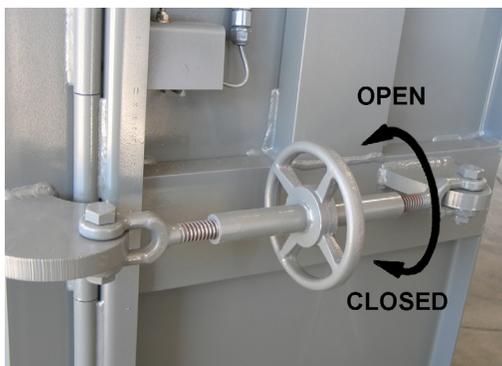
Do Not Slam the safety gate closed. The baler will not cycle unless the safety gate is closed and secured.

18. Press the down button. The baler will make one complete compaction cycle. The platen and safety gate will return to the Up/Loading position.
19. Load and cycle the baler until the bale complete light comes on. This indicates the bale is complete.

SECTION 2 - OPERATION

NOTE

If the safety gate is opened faster than the ram is moving up, the machine will automatically shut down.



20. Open bale door and band the bale. Six slots are provided in the bale chamber for this purpose.



The bale should be tied properly and securely before attempting to eject it from the machine. Do NOT attempt to enter the machine at any time unless it is properly locked out/tagged out in accordance with OSHA requirements.



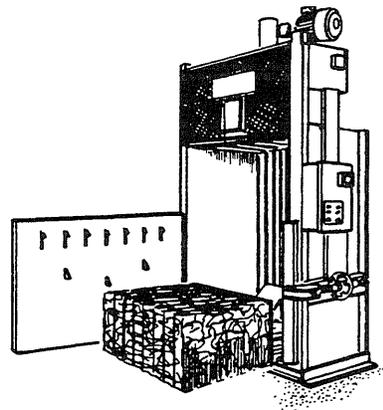
SLOTS

21. Connect the bale connector hook to the platen.

NOTE

Ensure the safety gate is completely down. Stand clear while ejecting the bale.

22. Raise platen by pressing (and holding) the up button. The bale should roll out of the machine.



23. Remove the bale, close and secure bale door and safety gate.
24. Depress Down button to cycle baler, and bale ejector hook should disengage automatically at the bottom of the cycle stroke.
25. When the platen and safety gate return to the UP "Load" position, the machine is ready to start loading material for the next bale.
26. Visually inspect that the hook is disengaged.



SHUT DOWN

27. Close the Safety Gate.
28. Depress Down button.
29. When the platen gets to the bottom of the compaction stroke, turn main power switch to off.
30. Perform any house cleaning necessary

SECTION 3 - PREVENTIVE MAINTENANCE

GENERAL

The main objective of a preventive maintenance program is to anticipate and prevent operational malfunctions before they require extended shutdown for major repairs.

Careful attention to accurate preventive maintenance will ensure and extend trouble-free operation of the machine. Providing special attention and care to the hydraulic system will extend the service life of the machine.

MAINTENANCE RECORDS

Prepare and adhere to a regular maintenance schedule. Accurate records of all maintenance performed and a regular review of all maintenance records may provide an indication of potential problems.



Do not get into the baler or place any portion of the body into the baler at any time unless the baler is shut down and locked out/tagged out in accordance with OSHA regulations. This precaution must be taken before any service or maintenance is attempted, including but not limited to clearing a jam or oversize bale.

HYDRAULIC FLUID INFORMATION

HYDRAULIC OIL

To serve its purpose and provide long and satisfactory service, hydraulic oil must possess desirable physical and chemical characteristics. Since stability under agitation and wide ranges of temperatures are very important, the crude from which the finished product has been processed should be of such a nature as to inherently possess these desirable characteristics.

Premium hydraulic oil should be used in these hydraulic systems, and in addition to the above characteristics, be further fortified by application of selected additives to provide additional resistance to wear, corrosion, oxidation, decomposition, and foaming. All additive treatment should be done by the lubricant supplier with additives that are compatible with each other as well as the base oil into which they are blended.

VISCOSITY INDEX

This factor is very important. Oils having low Viscosity Index values tend to be sluggish at lower temperatures and thin out rapidly as operating temperatures increase. This change in viscosity, to a degree, results from the use of oils having Viscosity Indexes below that recommended. The result of using low Viscosity Index oils is unsatisfactory lubrication at operating temperature. When the air temperature around the power unit varies from 32 to 100 degrees fahrenheit a minimum viscosity of 95 is required.

When the air temperature around the power unit varies from 10 to 100 degrees fahrenheit a minimum viscosity index of 135 is required.

LOW TEMPERATURE

It is recommended that oils to be used in these hydraulic systems have a maximum viscosity of 4000 SUS at 15 degrees fahrenheit. Also, the ambient temperature of the hydraulic oil should be maintained at about 90 degrees fahrenheit when the system is to be operated.

NEUTRALIZATION NUMBER

This characteristic is used in conjunction with other factors to determine the chemical and physical changes occurring within the oil as a result of extended use and service. The neutralization number of the oil should be given by the supplier and this information put on record by the operator. The change and rate of change occurring in the neutralization value is of utmost importance. It is this rate of change which is most important, rather than the actual neutralization number on the oil.

Some additives are given a higher neutralization number than others. It is therefore recommended that your compactor supervisor assume responsibility for periodic sampling of the oil in the system. Then laboratory analysis should be made by the supplier and the results interpreted to the operator, advising as to whether or not the oil in use is safe and satisfactory for continued service. Most reputable oil companies maintain laboratories and technical staff which are capable of analyzing hydraulic oil samples and advising the user as to the condition of the oil. Most such oil suppliers render the service on a no-charge basis to the customer.

We recommend the use of a commercial laboratory service for analysis of routine oil samples taken on a regularly scheduled basis. The cost per sample may vary depending on the laboratory service. The most important analysis are particle count, spectrochemical analysis, water content, and viscosity.

Harris will provide this service upon request.

SECTION 3 - PREVENTIVE MAINTENANCE

CONTAMINATION

It is estimated that as much as 70% of all hydraulic problems may be traced directly to the fluid. It is of utmost importance that all foreign matter be kept from the hydraulic oil. Invisible quantities of abrasive type contamination may cause serious pump wear, malfunctioning of pumps and valves, and sludge accumulations within the system in relatively short periods of time. Since the recommended hydraulic oils for these machines are fortified with various additives, it is essential that moisture and water be kept from the hydraulic oils and system. Additive treated oils have a definite affinity far more critical than was true in year past when only straight mineral oils were available. Adequate evidence of the ability of the oil to prevent undue pump wear may be shown by test conducted as per ASTM D2882 with a total weight loss of 50 mg. maximum. Other vane pump test with varying size of pump and/or length of time will be considered on the basis of the evidence submitted.

The base oil and its compounding should provide a finish oil that will not shrink or abnormally swell hydraulic sealing elements.

As reputable lubricant supplier backed up by a reputable oil company is an assurance of obtaining high quality products, and generally speaking, higher quality is worth the higher initial cost.

RECOMMENDED HYDRAULIC FLUID

General Specifications For Hydraulic Oil

- 10 Weight Premium Grade Oil (45) Non-Foaming
- Anti-Wear Additives
- Viscosity Index, 150
- Pour Point 30°F
- Flash Point 43°F

Hydraulic Oil Companies With Brand Name

- | | |
|---------|---------------------------|
| Amoco | Rykon Oil 21 or AW Oil 21 |
| Arco | AWS-215 |
| Chevron | EP Hydraulic 46 |
| Citgo | Pacemaker XD-46 or A/W |

Hydraulic 46

- | | |
|----------|-----------------------------|
| Exxon | Nuto H-46 |
| Gulf | Harmony 46 AW |
| Mobil | DTE25 |
| Phillips | Magnus "A" 46 |
| Shell | Tellus 46 |
| Sun | Sunvis 821 WR or Sunvis 747 |
| Texaco | Rando HD 46 |

HYDRAULIC FLUID TESTING

Hydraulic fluid samples should be taken periodically for laboratory analysis. The actual sampling method is critical. It should be done based on ANSI Standard B93.19M(R1980). This standard is available from the

National Fluid Power Association, 3333 N. Mayfair Road Milwaukee, WI 53222.

HARRIS will supply you the SAMPLE KITS, or you may obtain your own. Samples should be placed in a clean, dry, glass bottle with a non-shedding, screw-on cap, and labeled with the date, type of fluid, model and serial number of the machine.

Two identical samples should be taken, One for laboratory analysis and one for your own preliminary analysis while you are waiting for the lab report.

After your sample has been allowed to stand for 20 to 30 minutes to allow all air bubbles to dissipate, visually inspect by holding the bottle up to the light to check for debris in the oil and whether the oil is clear or cloudy.

Any debris is an indication of a severe solid contamination problem, the source of which must be located and corrected immediately. Common sources of this kind of contamination may be component wear,

LUBRICATION

Scheduled lubrication is essential to keep the baler operating correctly. Insufficient lubrication will result in rapid wear and shortened service life of baler components.

When lubricating, make sure enough grease is pumped into the bearing to force out any moisture, dirt, or other abrasive material so the shaft can move freely during operation. Remove any grease build up to keep the area clean.

When applying oil, be certain the oil fully lubricates the area, wipe any excess oil from the surfaces of non-moving components so it does not collect dirt or foreign material.

PERIODIC HYDRAULIC SYSTEM MAINTENANCE

BI-MONTHLY

- A. Check for leakage at all hydraulic fittings. Tighten or replace as required.
- B. With main bale door closed and latched and safety door in it's correct position, push the "UP" push button until platen is in it's upper most position. Remove oil filter breather cap on the oil reservoir.

Oil level should be approximately 3/4 full. If the level is low, add the required amount of oil to get level where is should be. Use oil equivalent to the specifications of oil listed in the installation instructions section. Being repetitive the specifications are:

SECTION 3 - PREVENTIVE MAINTENANCE

150 Viscosity/non foaming/10 weight/anti-wear additives.

NOTE

Ram should be in the upper most position before adding or checking oil level.

ANNUALLY

- A. Remove inspection plate on top of reservoir.
- B. Remove hydraulic suction filter and replace if necessary.

- C. Check oil, if dirty, remove drain plug on side of reservoir, drain oil. Replace oil to level mentioned in this section.
- D. Check all bolts on baler and pivot points for weakness. Repair or replace as required.
- E. Visually inspect complete baling press, Repair or replace as required.
- F. Grease door dogs.
- G. Grease platen guide ways.
- H. Grease motor bearings, if necessary.

BALING WIRE SPECIFICATIONS

SIZE	DIAMETER	BREAK PULL	ELONGATION	TENSIL
14' x 14' Ga. Single Hoop	080	380-420	25-30%	77,500-80,800
18'x12' Ga. Single Loop	105	600-670	25-30%	70,558-76,136
11 GA Auto-Tie	.119	730-830	25-30%	65,800-72,200
12 GA Auto-Tie	.104	550-630	25-30%	64,700-71,590

SECTION 4 - SERVICE ADJUSTMENTS

SETTING THE TIMER

Rotate the dial on the timer to the desired cycle time.



LIMIT SWITCHES

NOTE

Two adjustments are required on limit switches after they have been installed.

1. Length of the actuator arm.
 - A. Loosen the socket head capscrew that holds the arm shaft clamp. Lengthen or shorten as necessary, so that only the wheel at the end of the arm comes in contact with the trip mechanism. This minimizes any unnecessary wear to the actuator arm. Retighten set screws.
2. Adjusting timing.
 - A. Determine which direction the switch should be adjusted and loosen the shaft clamp screw. (SEE ILLUSTRATION BELOW) Rotate the shaft and retighten screw.



PROXIMITY SWITCHES

NOTE

Proximity switch adjustments should only be completed by trained personnel.

1. Locate the proximity switch.
2. Loosen both of the nuts holding the switch in place. (one on each side of the bracket)
3. Slide the switch in the appropriate location.
4. Tighten both nuts back in place.



LIMIT SWITCH/PROXIMITY SWITCH LOCATIONS



Up Stop Proximity Switch

SECTION 4 - SERVICE ADJUSTMENTS



Bale Size Limit Switch



Gate Platen Proximity Switch



Gate Closed Proximity Switch



Bale Door Proximity Switch

SECTION 5 - SERVICE AND REPAIR

IMPORTANT

Regular service and proper repair is essential for the reliable and safe operation of all mechanical equipment. Service procedures and repair practices described in this manual are effective methods of performing service.



Deviation from the prescribed procedures could damage the baler, render it unsafe, or endanger the safety of the operator or service personnel. However, remember that these procedures are not all inclusive because of the variations in baler installations. It is impossible for Harris to know, evaluate, and advise service personnel of all possible methods in which service could be performed, or of every possible hazard and the consequences of each method. Anyone who uses a service or repair procedure which is not recommended by Harris must be completely satisfied that neither maintenance personnel nor the operator's safety will be jeopardized by the method selected, and take sole responsibility for the action and results.

PREPARATION FOR SERVICE

Harris recommends the entire baler surface in the area to be serviced and the surrounding work area be cleaned before starting. Very often, cleaning will uncover potential trouble sources. A check for correct tools and required replacement parts should be made before the work is started to reduce downtime for the service procedure.

Preparation is a very important factor for efficient and safe service and repair work. Cleaning the work area before starting to work will make it easier to perform the necessary service and reduce the possibility of misplacing parts and tools.

DURING SERVICE AND REPAIR

1. Always wear safety glasses and use proper safety shields, clothing, etc.
2. Never place any part of the body in a potential pinch point.
3. Always stand clear when a lifting device is in use.

DURING REMOVAL, DISASSEMBLY AND REPAIR

1. Cleanliness is very important. Dirt is the number one cause of wear in bearings, bushings and hydraulic components.
2. Inspect hydraulic components for leaks before cleaning. Dirt buildup on components can aid in tracing oil leaks.
3. Clean hydraulic connections before removing to prevent dirt from entering the system.
4. Loosen hydraulic fittings slowly to release pressure.
5. Cap fittings immediately after removal to prevent dirt from entering components and fluid lines.
6. Clean components in nonflammable compatible solvent before disassembly.
7. Inspect components after cleaning for signs of wear or external damage.
8. When disassembling a component, note the position of each part as it is removed to aid in reassembly.
9. During disassembly, note the condition of each part as it is removed to aid in diagnosing problems.
10. Clean and inspect disassembled parts for wear, cracks, dirt, etc.
11. After cleaning and inspection, reusable hydraulic parts should be immediately coated with clean, fresh hydraulic fluid to prevent rust formation. If these parts are not going to be reinstalled immediately, they should be wrapped in a clean, lint-free cloth or paper to prevent picks or scratches.
12. When re-packing a cylinder, or resealing a valve, replace all seals and O-rings that are disturbed during repair. The price of a few seals is very little, compared to a repeat repair job.

DURING REASSEMBLING AND INSTALLATION

1. Assemble parts in the same position they were removed from.
2. Align parts accurately before mating.
3. Inspect O-ring and seal grooves for sharp edges, nicks or burrs before installing new sealing parts.
4. Lubricate all new sealing parts with clean, fresh hydraulic fluid prior to installation.

SECTION 5 - SERVICE AND REPAIR

5. Use care not to damage new sealing parts during reassembly.
6. Use correct torque values when reassembling and installing components. See the Capscrew Marking And Torque Values chart at the end of the manual.
7. Always check hydraulic fluid level in the hydraulic fluid tank after performing any service or repair of the hydraulic system.
8. Always lubricate components with grease fittings after they have been repaired and reinstalled.
9. Use only genuine Harris replacement parts.
3. Remove the cylinder rod gland from the cylinder rod.
4. Remove plugs in the cylinder ports and secure the cylinder tube.
5. Slowly and carefully, pull the cylinder rod and piston from the cylinder tube.

NOTE

It may require a mechanical device to pull the cylinder rod and piston.

NOTE

See the correct section of Service And Repair for specific instructions.

CYLINDER REPAIR

CYLINDER REMOVAL

1. Raise the platen to the full Up position. Open the bale door and use a lift-truck to support the platen.
2. Properly lockout/tagout the machine and secure work area.
3. Remove the four mounting bolts, nuts, and washers.
4. Using the lift-truck, slowly lower the platen and cylinder. Remove the platen and cylinder from the baler.
5. Remove the cylinder from the platen.
6. Remove the old seals and carrier band from the piston.
7. Install the new seals and carrier band.
 - A. It may be necessary to use a screwdriver to expand the seals and band, so they can be installed. Use caution to prevent damage to the new parts.
 - B. Apply a light coat of hydraulic fluid on the new seals before installation.
8. Replace the O-rings and seals in the cylinder rod gland.

NOTE

Apply a light coat of hydraulic fluid to all components.

9. Reassemble the cylinder in the reverse order of disassembly.

NOTE

Use caution to prevent damage to the new seals when sliding piston and rod into cylinder tube.

NOTE

While disconnecting any hydraulic line, valve or cylinder:

- A. **Make certain there is no pressure in any hydraulic line in the location of repair work.**
- B. **Be sure to collect the hydraulic fluid which will drain from loosened connections.**

CYLINDER DISASSEMBLY

1. Lay the cylinder in a horizontal position with pods up. Block both ends of the cylinder so it is level.

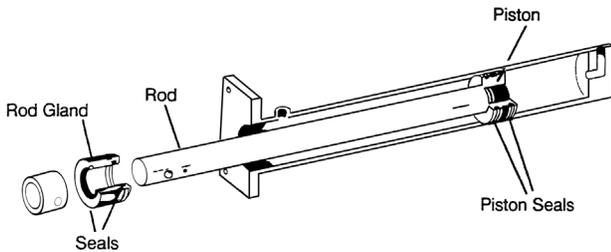
NOTE

Some cylinders have a set screw to lock the rod gland. Remove if applicable.

2. Using the correct spanner wrench, unscrew the cylinder rod gland from the tube.

SECTION 5 - SERVICE AND REPAIR

10. When the cylinder is assembled, connect it to the platen and install it in the baler in the reverse order of disassembly.



PUMP REMOVAL AND REPLACEMENT

NOTE

Whenever disassembling any hydraulic line, valve or cylinder:

- A. Make certain there is no pressure on the fluid in the location of the work.
- B. Be sure to collect the hydraulic fluid which will drain the loosen connection.



Never enter the Baler or attempt to perform service or make repairs, unless the power is off and the work area is secured.

1. Disconnect the discharge hose from the pump.
2. Remove the tank cover plate capscrews.

NOTE

Watch for the key when removing coupler from the pump and motor shaft.

3. Remove the pump and cover plate from the hydraulic reservoir.

NOTE

Suction strainer is attached to the suction tube.

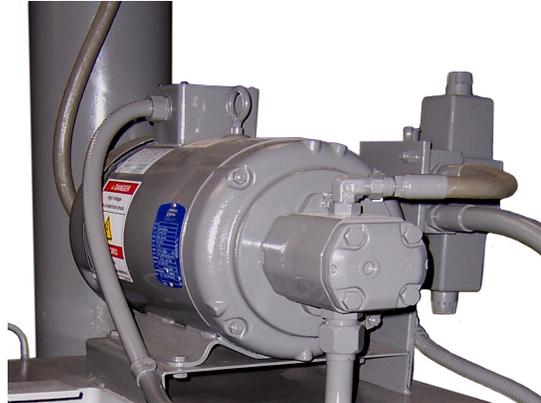
4. Unscrew the pump from the suction tube. Make sure the bushing remains on the suction tube.
5. Unbolt the pump from the electric motor and separate the two.

6. Reassemble in the reverse order of disassembly.

NOTE

It is recommended that a new suction strainer be installed when a pump is repaired or replaced.

7. When replacing the cover plate on the hydraulic reservoir, it will be necessary to use a silicone type sealant to seal the cover and prevent contamination.



PLATEN WEAR STRIP REPLACEMENT

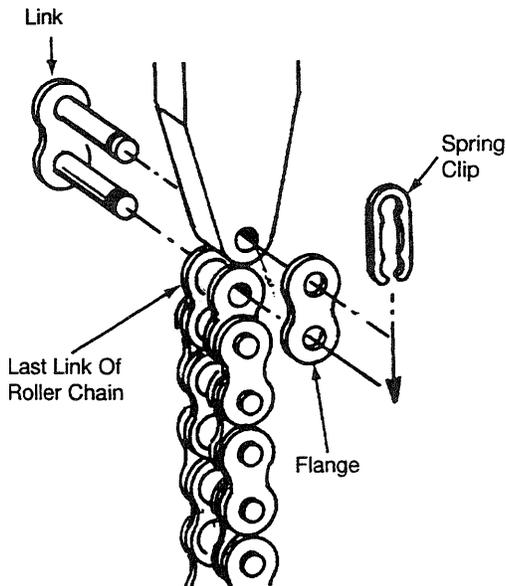
1. Block the platen so it remains approx. 10" up from the baler floor.
2. Remove the cylinder pin and cable which connects the cylinder rod to the platen.
3. Retract the cylinder rod.
4. Using a lift truck remove the platen from the baler. Remove the screws which hold the wear strips in place.
5. Replace all 6 wear strips with new material.
6. Reassemble the platen and connect the cylinder rod and pin.

REPLACING THE CONNECTING LINK

(Each baler has spare in panel)

REPLACING A BROKEN CHAIN MASTER LINK

1. Remove master link spring lock clip. Use screwdriver to spread spring lock clip enough to remove master link.
2. Use small screwdriver or nail to push old master link through chain and bale eject arm.
3. Put new master link through chain and eject arm.
4. Place master link flange in place.
**Be sure link flange is pushed on far enough for spring lock clip to fit in the pins.



5. Place spring lock clip cover link pin. Spread spring clip over pin. Tap spring lock clip with hammer and screwdriver to be sure spring lock clip is securely in grooves in the pins.

NOTE

- The master link is designed to be the weakest part of the bale eject system and will fall before damage is done to the eject system. Check the system carefully to be sure it moves freely after installing the master link and before operation.

- There are 2 extra links provided with each new baler. They are located inside the control panel.

IMPORTANT SERVICE INFORMATION

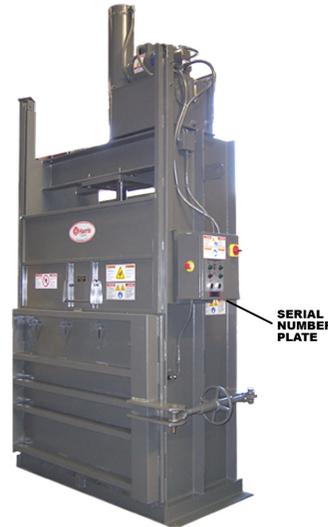
TO ORDER PARTS

Contact: HARRIS WASTE MANAGEMENT GROUP
P.O. Box 340, Jekyll Road
Baxley, GA 31513
912-367-4661 (800-447-3526)
Fax 912-367-5227

Provide the following information

- A. Company Name.
- B. Order Number.
- C. Model Number of Baler.
- D. Serial Number of Baler.
- E. Quantity, Part No. and Description of parts.

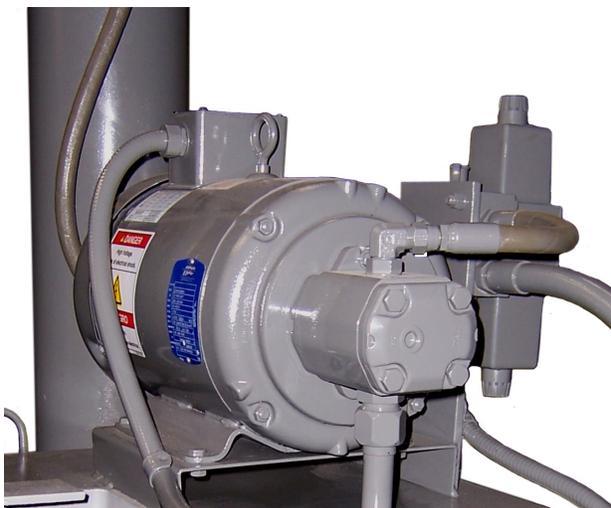
Serial number plate is located behind the control panel on the baler frame.



SECTION 6 - TROUBLESHOOTING

PUMP

The hydraulic system receives output pressure from a vane type pump mounted on the motor to pump adapter located on top of the reservoir. Because of the pumps horizontal mount on top of the reservoir, servicing the pump is much easier. To service the pump, unbolt the two bolts that hold the pump on the adapter, then remove both the suction line and the pressure line.



NOTE

Do not allow motor to run for more than 60 seconds at full relief setting as excessive heat build-up will occur during long duration of running at maximum relief pressure.

RELIEF VALVE

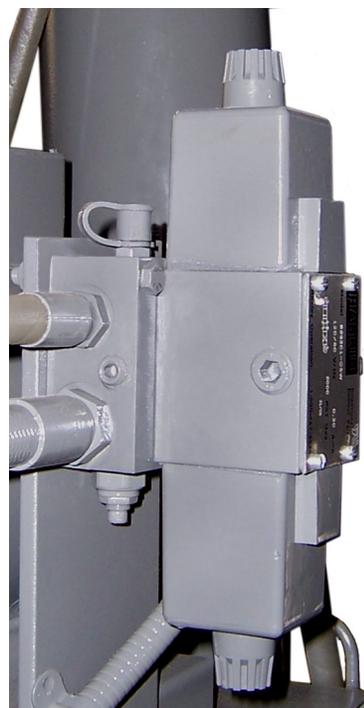
The relief valve is a direct operated cartridge type, screwed into the manifold underneath the directional control valve, for ease of adjustment and replacement. The only function this unit provides is to limit the maximum pressure available to the hydraulic circuit.



Pressure settings are preset at the factory or during installation of the baler. Tampering with these adjustments will result in the warranty of the baler being voided.

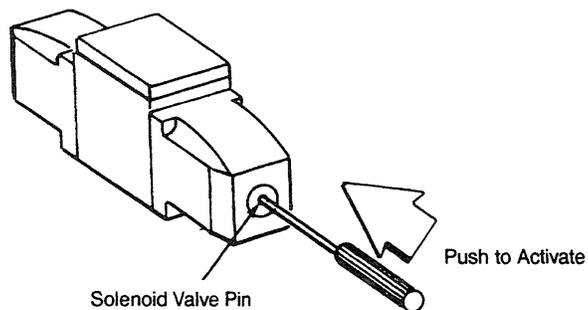
DIRECTIONAL CONTROL VALVE

The three position solenoid operated directional valve directs oil flow from the pump to the rod end or piston end of main cylinder. In the neutral position, oil flow is directed back to the hydraulic reservoir. When the "down" solenoid is energized, oil flow is directed to the piston end, extending the cylinder. When the "up" solenoid is energized, oil flow is directed to the rod end, retracting the cylinder.



To manually energize the solenoid valve, use a welding rod or small screwdriver and depress the pin located on the end of the solenoid, as shown.

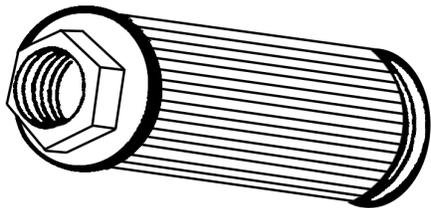
In the event that all checks are made and the problem cannot be corrected, contact the Harris Service Department at 1-800-447-3526.



SECTION 6 - TROUBLESHOOTING

SUCTION FILTER

The suction filter is located at the base of the suction line of the pump inside the hydraulic oil reservoir. Oil being pumped by the pump passes through the filter, cleaning oil of foreign particles or any material that may have gotten inside the reservoir. To change or clean the filter, remove the inspection plate located on top of the reservoir and, by hand, unscrew the filter from the pump's suction line. When reinstalled, hand tighten only.



ELECTRICAL TESTING

The electrical system used on the baler consists of various lights, switches and wiring. Testing the components and wiring can be accomplished by CHECKING FOR CONTINUITY

TEST FOR INTERNAL LEAKAGE OF CYLINDER

1. Use blocking material to block the platen and prevent it from moving.



Never enter the Baler or attempt to perform service or make repairs, unless the power is off and the work area is secured.

2. Close and secure bale door, close safety gate.
3. Disconnect the cylinder hose on the directional valve subplate which goes to the rod of the cylinder, and drain all of the oil from the hose.
4. Use a gallon container to catch the fluid which may escape from the loosened hose.
5. Depress and hold the "down button". Observe the oil flow. The flow of hydraulic fluid should not exceed 1 gallon per minute.

NOTE

When disassembling any hydraulic line, valve or cylinder:

- A. Make certain there is no pressure on the fluid in the location of the work.**
- B. Be sure to collect the hydraulic fluid which will drain from the loosened connection**

CHECKING CONTINUITY

A continuity tester is used to check the ability of a conductor to allow current to pass through it. A continuity tester uses a self-contained power source, and should never be used on a live circuit. Connect the clip to one side of the isolated component to be tested and touch the probe to the other side. If the component has the potential to pass current, "has continuity", the light will be on. If the component is not able to pass current, there is no continuity and the light will be off.

SECTION 6 - TROUBLESHOOTING

<i>MOTOR WILL NOT START</i>	
POSSIBLE CAUSE	CORRECTIVE ACTION
A. No incoming power.	<ol style="list-style-type: none"> 1. Check control panel power on. 2. Check main power source.
B. Gate closed proximity switch (PRX-3).	<ol style="list-style-type: none"> 1. Gate not closed properly. 2. Proximity switch malfunction. 3. Adjust proximity switch.
C. Bale door proximity switch (PRX-4).	<ol style="list-style-type: none"> 1. Door not closed properly. 2. Proximity switch malfunction. 3. Adjust proximity switch.
D. Emergency stop button depressed.	<ol style="list-style-type: none"> 1. Pull button out.
E. Blown primary control fuse.	<ol style="list-style-type: none"> 1. Replace fuse (Power on light does not illuminate)
F. Blown secondary control fuse.	<ol style="list-style-type: none"> 1. Check fuse with ohmmeter. (Power on light does not illuminate)
G. Motor overload tripped.	<ol style="list-style-type: none"> 1. Reset overload on motor starter. 2. Check current load (AMPS).
H. Electrical Circuit Malfunction.	<ol style="list-style-type: none"> 1. Perform electrical system continuity check.

<i>PLATEN WILL NOT MOVE</i>	
POSSIBLE CAUSE	CORRECTIVE ACTION
A. Motor malfunction.	<ol style="list-style-type: none"> 1. See motor troubleshooting.
B. Gate closed proximity switch (PRX-3).	<ol style="list-style-type: none"> 1. Gate not closed properly. 2. Proximity switch malfunction. 3. Adjust proximity switch.
C. Bale door proximity switch (PRX-4)	<ol style="list-style-type: none"> 1. Door not closed properly. 2. Proximity switch malfunction. 3. Adjust proximity switch.
D. Low oil level.	<ol style="list-style-type: none"> 1. Check oil reservoir level. Add oil if necessary.
E. Directional valve malfunction.	<ol style="list-style-type: none"> 1. Check valve solenoid.
F. CR-1 Relay malfunction.	<ol style="list-style-type: none"> 1. Check voltage at terminal No.
G. Incorrect pump rotation.	<ol style="list-style-type: none"> 1. Check electric motor fan rotation (should be clockwise when viewed from rear of cooler).
H. Electrical circuit malfunction.	<ol style="list-style-type: none"> 1. Perform electrical system continuity check.

SECTION 6 - TROUBLESHOOTING

PLATEN WILL NOT REVERSE TO CYCLE

POSSIBLE CAUSE	CORECTIVE ACTION
A. Pressure switch malfunction (Timer board malfunction)	<ol style="list-style-type: none"> 1. Improper pressure setting. 2. Electrical contact bad. 3. Plunger not moving.
B. Relay CR-1 malfunction (Timer board malfunction)	<ol style="list-style-type: none"> 1. Check solenoid -A 2. Relay contact bad.
C. Solenoid valve malfunction.	<ol style="list-style-type: none"> 1. Check solenoid -A. 2. Valve spool not moving (manually energize solenoid to move spool)
D. Hydraulic system pressure low.	<ol style="list-style-type: none"> 1. Check system pressure. 2. Relief valve malfunction. 3. Worn pump.
E. Cylinder bypass.	<ol style="list-style-type: none"> 1. Check for internal cylinder leakage.

MOTOR WILL NOT STOP WHEN PLATEN RETURNS TO UP POSITION

POSSIBLE CAUSE	CORECTIVE ACTION
A. Proximity switch malfunction (PRX-1).	<ol style="list-style-type: none"> 1. Check for broken switch arm. 2. Bad contact. 3. Improper switch adjustment.

MOTOR WILL NOT STOP WHEN BALE IS COMPLETE

POSSIBLE CAUSE	CORECTIVE ACTION
A. Bale size limit switch (LS-5).	<ol style="list-style-type: none"> 1. Check for broken switch arm. 2. Bad contact. 3. Improper switch adjustment.

CANNOT EJECT BALE

POSSIBLE CAUSE	CORECTIVE ACTION
A. Bale eject hook not engaged.	<ol style="list-style-type: none"> 1. Check hook rear of baler.
B. Broken chain.	<ol style="list-style-type: none"> 1. Check master link.
C. Relay malfunction CR-1.	<ol style="list-style-type: none"> 1. Check relay contacts # 1 & 7 with UP button depressed.
D. Up button malfunction.	<ol style="list-style-type: none"> 1. Check contacts.
E. Solenoid valve malfunction.	<ol style="list-style-type: none"> 1. Check solenoid A. 2. Valve spool not moving manually energized solenoid.
F. Electrical circuit malfunction.	<ol style="list-style-type: none"> 1. Perform electrical system continuity check.

SECTION 6 - TROUBLESHOOTING

<i>PLATEN WILL NOT REMAIN IN UP POSITION</i>	
POSSIBLE CAUSE	CORECTIVE ACTION

- | | |
|--------------------------------|---|
| A. Cylinder bypass. | 1. Check for internal cylinder leakage. |
| B. Solenoid valve malfunction. | |

<i>PUMP NOISE</i>	
POSSIBLE CAUSE	CORECTIVE ACTION

- | | |
|-----------------------------------|-------------------------------------|
| A. Oil reservoir level low. | 1. Check oil level. |
| B. Air leakage in oil intake. | 1. Check for foamy hydraulic fluid. |
| C. Worn pump. | 1. Check hydraulic system pressure. |
| D. Restricted inlet oil strainer. | 1. Replace strainer. |

<i>MAXIMUM HYDRAULIC PRESSURE NOT OBTAINABLE</i>	
POSSIBLE CAUSE	CORECTIVE ACTION

- | | |
|----------------------------------|--|
| A. Improper pressure adjustment. | |
| B. Worn pump. | |
| C. Relief valve malfunction. | |
| D. Cylinder bypass. | |

SECTION 7 - APPENDICES

Appendix A

Maintenance Checklist

Model: _____

Serial: _____

	A	M	W	D
Drain hydraulic oil from tank with cylinder retracted. Analyze a sample of hydraulic fluid and log results	●			
Clean or replace suction strainer	●			
Remove both inspection plates and access covers. Completely clean inside of reservoir with non-flammable compatible cleaning solvent. Make certain all surfaces are clean and dry	●			
Check/Clean limit switch/proximity switch	●	●	●	
Inspect air breather filter. Clean/replace if necessary	●	●	●	
Check all bolts for tightness	●	●	●	
Check oil sight glass for correct oil level	●	●	●	●
Check hydraulic hoses and fittings for leaks	●	●	●	●
Ensure safety interlocks function properly	●	●	●	●
Inspect warning decals for legibility	●	●	●	●
Inspect chain connections	●	●	●	●
Check for cracked welds and structural damage	●	●	●	●

SECTION 7 - APPENDICES

Appendix B Torque Chart

	Usage Common	Common	Under 2"	Large Sizes Only
Minimum Tensile Strength	60,000 PSI	105,000 PSI	150,000 PSI	125,000 PSI
Calculate Pre-Load Stress	27,000 PSI	61,000 PSI	98,000 PSI	30,000 PSI
Grade or Type	SAE GR-2	SAE GR-5	SAE GR-8/Hex Head Socket	HARIS HEAD
Capscrew Head Markings or Head Type			 	
SIZE (INCHES)	TORQUE FT-LB (Kg m)	TORQUE FT-LB (Kg m)	TORQUE FT-LB (Kg m)	TORQUE FT-LB (Kg m)
1/4	3 (0.41)	8 (1.11)	12 (1.66)	-
5/16	7 (0.97)	16 (2.21)	26 (3.60)	-
3/8	13 (1.80)	29 (4.01)	46 (6.36)	-
7/16	20 (2.77)	44 (6.09)	71 (9.82)	-
1/2	31 (4.29)	69 (9.54)	110 (15.3)	-
9/16	43 (5.95)	96 (13.3)	154 (21.3)	-
5/8	60 (8.30)	135 (18.7)	217 (30.0)	-
3/4	106 (14.7)	239 (33.1)	383 (53.0)	-
7/8	170 (23.5)	383 (53.0)	615 (85.1)	-
1	254 (35.1)	571 (79.0)	920 (127)	-
1-1/4	505 (69.8)	1140 (158)	1820 (252)	-
1-1/2	860 (119)	1940 (268)	3110 (430)	930 (129)
1-3/4	-	-	-	1649 (228)
2	-	-	-	2530 (350)
2-1/2	-	-	-	5070 (701)
3	-	-	-	8890 (1230)
3-1/2	-	-	-	14270 (1974)
4	-	-	-	21470 (2969)
5	-	-	-	42300 (5850)

NOTE: Torque values are based on coefficient of friction of .15 with the calculated pre-load stress in the root of the thread on all bolts.

SECTION 7 - APPENDICES

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SECTION 7 - APPENDICES

- The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.

Table 2: Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.

Type and Magnitude	Hazards	Methods to Control
Electricity, 480V Power Circuit	Electric shock	Disconnect main power source
Electricity, 110V Control Circuit	Electric shock	Disconnect main power source

- If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).

Table 3: Type(s) and location(s) of machine or equipment operating controls.

Type of Controls	Location of Controls
Push button and switches	Operator control panel

- Deactivate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

Table 4: Type(s) and location(s) of energy isolating devices

Types of Energy Isolating Devices	Locations of Energy Isolating Devices
Main power disconnect switch	Main power panel

SECTION 7 - APPENDICES

5. Lockout the energy isolating device(s) with assigned individual lock(s).
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

Table 5: Type(s) of stored energy - methods to dissipate or restrain.

Type of Stored Energy	Method to dissipate or restrain
Residual hydraulic system pressure	Vent hydraulic fluid to tank (only required when servicing hydraulic system)
Gravity (Vertical Platen and Cylinder)	Extend Platen to lowest position (if possible). If not possible, securely block platen or cylinder rod (as appropriate) to prevent it from falling.

7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

Table 6: Method of verifying the isolation of the equipment.

Method of verifying the isolation of the equipment
Attempt to start baler by following start up procedure.
If baler fails to start up, the baler has been successfully isolated.

8. The machine or equipment is now locked out.

SECTION 7 - APPENDICES

Restoring Equipment to Service

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

- 1. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.**
- 2. Check the work area to ensure that all employees have been safely positioned or removed from the area.**
- 3. Verify that the controls are in neutral.**
- 4. Remove the lockout devices and reenergize the machine or equipment. Note: The removal of some forms of blocking may require reenergization of the machine before safe removal.**
- 5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for used.**

[54 FR 36687, Sept. 1, 1989 as amended at 54 FR 42498, Oct. 17, 1989; 55 FR 38685, Sept. 20, 1990; 61 FR 5507, Feb. 13, 1996]

American National Standard



ENVIRONMENTAL INDUSTRY
A S S O C I A T I O N S

*for Equipment Technology and
Operations for Wastes and
Recyclable Materials –
**Baling Equipment –
Safety Requirements for Installation,
Maintenance and Operation***



WASTE EQUIPMENT TECHNOLOGY ASSOCIATION
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ANSI Z245.5 - 2004

American National Standard
for Equipment Technology and Operations
for Wastes and Recyclable Materials

Baling Equipment —
Safety Requirements for
Installation, Maintenance and Operation

Secretariat
Environmental Industry Associations

Approved May 21, 2004
American National Standards Institute, Inc.

American National Standard

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Published by

**Waste Equipment Technology Association
(Part of Environmental Industry Associations)
4301 Connecticut Ave., N. W., Washington, D.C. 20008**

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Printed in the United States of America

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FOREWORD (This foreword is not part of American National Standard Z245.51 -2004)

This American National Standard is applicable to the safety requirements for the design and construction of commercial baling equipment commonly used in recycling, solid waste disposal and raw materials handling. A companion standard, ANSI Z245.5 – 2004 establishes safety requirements for the installation, maintenance and operation of commercial baling equipment. Both these standards taken together revise and replace ANSI Z245.5 – 1997.

The effective date of this standard shall be 12 months after the approval date of this standard by the American National Standards Institute, Inc. For all baling equipment manufactured prior to 12 months after the approval date of this standard, please refer to the previous editions of the ANSI Z245.5 standard.

Inquiries, requests for interpretation and suggestions for the improvement of this standard should be directed to the Secretary, Accredited Standards Committee Z245, c/o Environmental Industry Associations, 4301 Connecticut Ave., NW, Suite 300, Washington, D.C. 20008.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee Z245 on Equipment, Technology and Operations for Wastes and Recyclable Materials. Committee approval of this standard does not necessarily imply that all members of the committee voted for its approval. At the time it approved this standard, the Z245 Committee had the following members:

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C. Phillip Headley, Secretary

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American National Standard
for Equipment Technology and Operations
for Wastes and Recyclable Materials —

**Balers —
Safety Requirements for
Installation, Maintenance and Operation**

0 Introduction

This standard was developed by American National Standards Institute Accredited Standards Committee Z245 Subcommittee 5 on Balers and approved by Accredited Standards Committee Z245.

This standard revises the baling equipment safety requirements found in ANSI Z245.5-1997 by providing specific requirements for installation, maintenance, repair and operation necessary to ensure the safe operation of the baler.

This standard complements ANSI Z245.51-2004, which details the safety requirements for design and construction of balers.

The requirements contained in this standard pertain to new balers as produced by the manufacturer. New requirements and revisions are not intended to be retroactive for balers manufactured to comply with earlier revisions of this standard. Refer to the approved edition of ANSI Z245.5 in effect at the time of manufacture for those requirements.

The requirements contained in this standard are not intended to apply to other components of end-use applications where a baler is part of a designed system.

Exceptions and notes contained in the standard apply to the clause or sub-clause in which they are contained or to which they reference. Exceptions pertain to normative requirements. Notes are informative and provide guidance for the evaluation of a normative requirement.

The units of distance measurement used in this standard are in the inch-pound system. When a value for measurement is followed by a value in other units in parentheses, the second value is only approximate. The first value is the requirement.

1 Scope

1.1 This standard revises safety requirements with respect to the installation, operation, maintenance, service, repair, modification, and reconstruction (where applicable) of baling equipment covered by ANSI Z245.5 - 1997, *Baling Equipment – Safety Requirements*.

1.2 The requirements of this standard apply to balers rated at 600 volts or less, for outdoor or indoor use, and are employed in accordance with the manufacturer's installation, operation, and maintenance instructions and procedures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI A1264.1-1995 (R2002), *Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems*.

ANSI Z245.51-2004, *Baling Equipment — Safety Requirements*

The following regulations contain provisions which, through reference in this text, constitute provisions of this American National Standard.

OSHA 29 CFR Part 1910.146, *Permit Required Confined Spaces*¹
OSHA 29 CFR Part 1910.147, *Lockout/Tagout of Energy Sources*²

3 Definitions

For the purposes of this American National Standard, the definitions below apply to terms used throughout this standard, unless the context clearly indicates otherwise.

3.1 access cover or door: A panel covering an opening that is designed to permit access to the interior of the baler.

3.2 access gate: A moveable barrier/guard that swings on hinges or moves in/on a track and is distinguished from a door by having openwork.

3.3 affected employee: An employee whose job functions place them in proximity to potential hazards related to work being performed by authorized employees.

3.4 authorized employee: A person who, on the basis of their specific experience and training, is permitted to perform certain designated duties.

3.5 automatic bale tying device: A device which installs wires or bands around a bale to maintain the bale's compressed state.

¹ Available online at <http://www.gpo.gov/nara/cfr/index.html>.

² Available online at <http://www.gpo.gov/nara/cfr/index.html>.

3.6 automatic start/cycling control: A control that uses an automatic actuator or sensor to initiate the operation of the baler on demand, when refuse is loaded into the loading chamber.

3.7 bale: A mass of material compressed, with or without binding, to a density or form that supports handling and transportation as a material unit.

3.8 bale chamber: The area of the baler where compression takes place and the bale is formed.

3.9 bale chamber door(s): The portion of the baling chamber that is opened to permit ejection of the bale.

3.10 bale ejector system: The mechanism used to assist in the removal of a finished bale from the baling chamber.

3.11 bale restraint device: A device that exerts pressure on the bale to increase the density during formation in horizontal extrusion type balers.

3.12 bale tie slot: A space or area provided for insertion of bale ties to tie or secure the finished bale.

3.13 baler: A machine used to compress solid waste, primary materials, or recoverable materials, with or without binding, to a dense form that will support handling and transportation as a material unit. This specifically excludes stationary compaction equipment that may be used to compact materials into a container. (see Figures 1 through 7 for illustrations of types of baling equipment.)

3.14 baler loading hopper: An extension of the loading chamber on balers that provides for accumulation of material during the ram full cycle.

3.15 baler types: Balers are generally either single-stage balers or multiple-stage balers. Several types of balers are covered by this standard. They are classified as follows:

- a) **single-stage baler:** A baler with one ram mechanism.
 - i) **vertical downstroke baler:** A single-stage baler in which the ram travels in a vertical direction, initially downward (compression stroke), then returns to its rest position (retract stroke).
 - ii) **vertical upstroke baler:** A single-stage baler in which the ram travels in a vertical direction, initially upward (compression stroke), then returns to its rest position (retract stroke).
 - iii) **horizontal closed-chamber baler:** A single-stage baler in which the ram movement is horizontal and the end of the bale chamber is fixed by a bale chamber door.
 - iv) **horizontal extrusion baler:** A single-stage baler in which the ram movement is horizontal, the end of the bale chamber is open, and a bale restraint device is provided.
- b) **multiple-stage balers:** Balers with two or more separate ram mechanisms.
 - i) **two-stage horizontal/vertical (continuous) extrusion baler:** A multiple-stage baler in which the first-stage ram operates with a vertical downstroke compression stroke perpendicular to the line of action of the second-stage ram.
 - ii) **two-stage horizontal baler:** A multiple-stage baler in which the first-stage ram operates with a horizontal compression stroke perpendicular to the line of action of the second-stage ram.
 - iii) **three (or more)-stage baler:** A multiple-stage baler in which each compression stroke operates perpendicular to the line of action of the preceding stroke.

3.16 cart: A wheeled container that receives, holds and stores loose refuse. Carts are generally classified by their size and application as either residential or commercial/industrial, in the following manner:

- a) **residential:** A two-wheeled container that receives, holds and stores loose refuse. It is typically used in collection of residential, commercial and industrial waste that utilizes mechanical lift systems for unloading. Residential carts typically range in size from 45 to 100-gallon capacity.
- b) **commercial/industrial:** A three- or four-wheeled container that receives, holds and stores loose refuse. It is typically used for the collection of commercial and industrial waste that utilizes manual lifting or mechanized lift systems for unloading. Commercial/industrial carts typically range in size from one-half (1/2) cubic yard to four (4) cubic yards in capacity.

3.17 chute: An enclosure connected to the baler and to an adjacent structure that funnels material into the loading chamber.

3.18 commercial waste: Waste produced by stores, offices, restaurants, warehouses, and other non-manufacturing operations.

3.19 component: A part or assembly which complies with specified requirements and is used in the construction of the baler.

3.20 confined space: An area within the baler that has adequate size or configuration for personnel entry, has limited means of access or egress, and is not designed for continuous employee occupancy.

3.21 container: A receptacle (also referred to as a bin) that receives, holds and stores loose or compacted refuse for lifting, unloading and/or transportation by mechanical means. Containers are specially designed for use with certain types of equipment. Containers used with rear-loading baling equipment will incorporate features that differ from containers used with front-loading baling equipment. Containers used in conjunction with tilt-frame, roll-off, hook-lift and hoist-type equipment will incorporate features that differ between types of compatible lifting mechanisms utilized, and are designed to be picked up, transported, unloaded, and set off by that equipment. Containers typically range in size from one (1) cubic yard to seventy (70) cubic yards in capacity.

3.22 container/cart-lifting systems: Component mechanisms, such as (but not limited to) lifting arms, forks, and hydraulic cylinders, cables, winches and reeving cylinders mounted to a foundation or stationary equipment that are used to complete a lift and dump cycle of containers and/or carts into the loading chamber of the baler.

3.23 continuously operating balers: Balers where the main motor remains in continuous operation, or can start automatically while unattended.

3.24 contract laborer: An employee of a person or company that provides labor (work) for a specified fee to another employer. A contract laborer may be used to supplement the employer's regular workforce and usually performs the same or similar duties as regular full-time employees.

3.25 contractor: A person (or company) who contracts to supply certain materials or provide a specific service (work) for a stipulated fee and/or a specified period such as baler equipment maintenance services. The work or service provided may be outside the scope of materials supplied or services provided by the employer or operator's workforce.

3.26 control of hazardous energy sources (lockout/tagout): A program which utilizes procedures for affixing appropriate lockout or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energizing, start-up, or release of stored energy in order to prevent injury to persons in or near the machines.

3.27 conveyor: A horizontal, incline, or vertical device for moving or transporting material in a path predetermined by the design of the device, and having fixed or selective points of loading and discharge.

3.28 cycle: The operation of a mechanism to perform one complete operation having a definite beginning and end.

3.29 dock ramp: A structural platform for walking on or driving a vehicle on that provides access from an adjacent structure or area to the baler.

3.30 electrical enclosure: That portion of a product that renders inaccessible any part that presents a risk of electrical shock.

3.31 electrical power disconnect: A device that breaks the circuit supplying all electrical power to the baler, and can be locked in the off position.

3.32 emergency stop (E-stop): A stop arising from a sudden and unexpected need, and not as part of normal operation. The device that can be actuated in an emergency situation to stop a machine's process or cycle.

3.33 employee: An individual hired by an employer to work for compensation.

3.34 employer: A person, company, or entity who hires one or more individuals, companies or entities to work for compensation.

3.35 energy sources: Sources of energy that include, but are not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, thermal and potential energy sources (e.g. gravity, kinetic, etc.).

3.36 guarding: The use of a device or mechanism designed and constructed to prevent the operator of baler and others from coming into physical contact with the point of operation or a hazard.

3.37 hazard: A condition of such a nature that it may precipitate an accident or injury.

3.38 industrial waste: Waste produced as a result of manufacturing, industrial processes, or demolition operations.

3.39 informative: Refers to the portions of this standard provided only for purposes of clarification, illustration and general information. The portions of this standard considered informative do not contain mandatory requirements. The Foreword, Notes and Annexes are considered informative.

3.40 installer: A company or person responsible for putting a baler in place, activating it, and performing initial checks.

3.41 integrated power unit: Power unit that is contained within the body/framework of the baler.

3.42 interlock: A device or mechanism used to connect individual components together so that the action of one part of the baler is constrained by, or dependent upon, another.

3.43 loader: An individual, 16 years old or older, who is trained and authorized by the employer to place materials into the loading chamber of a baler, but who is not authorized to operate the baler.

3.44 loading chamber: The opening within the structural configuration of the baler in which the material is loaded prior to compression by the ram.

3.45 loading height: The vertical distance between loading sill and working surface.

3.46 loading hopper: An enclosure mounted on the baler that serves to direct the flow of material into the loading chamber.

3.47 loading sill: The ledge over which material is deposited into the baler.

3.48 lockable device: A device that, once locked, will prevent opening or removal of the access door or cover it is protecting, and requires a key-like device to unlock. Device can also be used to prevent unauthorized operation of the baler.

3.49 main control panel: The panel that contains the motor starting controls and relays.

3.50 maintenance personnel: Employees who are trained and authorized by the employer to service, inspect, clean, repair, or maintain balers.

3.51 maintenance testing: Functional and operational checks that may be performed on balers and systems by authorized employees before, during, or after maintenance and before placing the baler back in regular service.

3.52 manufacturer: The term manufacturer includes any intermediate or final-stage manufacturer prior to the baler being offered for sale.

3.53 maximum system pressure: The maximum operating pressure in the hydraulic system corresponding to the pressure relief valve setting for the system.

3.54 mechanical enclosure: A portion of the product that prevents unintentional contact with internal mechanical parts that involve risk of injury.

3.55 modification: Any change, alteration, addition to or removal from the original equipment or component, made in such a manner that the changed or altered portions or function of the equipment or component are different than the manufacturer's original design, specification, or use.

3.56 normative: Refers to the portions of this standard containing the mandatory requirements (shall). The body of this standard is considered normative.

3.57 operating controls: The controls for operating the baler. They can be mounted on the main control panel, the baler frame or located remotely at a control station.

3.58 operator: An individual, 18 years old or older, who is trained and authorized by the employer to operate a baler.

3.59 owner: An individual, corporation, partnership, legal entity, employer, or business that holds legal ownership papers, title, or lien, on or to, the baler equipment, unit, or system.

3.60 permit required confined space: A confined space within the baler that contains or has the potential to contain a hazardous atmosphere, material which may engulf a worker, converging walls or other configurations which could trap a worker, or has any serious safety or health hazards.

3.61 person: An individual, corporation, partnership, legal entity, or business.

3.62 pinch point: A point at which it is possible for a person to be caught between moving parts, or between moving and stationary parts, of the baler.

3.63 pit: A cavity in the ground, floor, or a sunken or depressed area that is adjacent to a floor area. A pit may be used to store materials to be fed into the baler.

3.64 platen: see ram.

3.65 point of operation: The area of the equipment where work is performed upon the material.

3.66 ram (also known as platen): The powered component of a baler that moves the refuse from the loading chamber to where it is compacted. (See figures 1 - 6.)

3.67 rated component pressure: The rated working pressure as provided by the component manufacturer.

3.68 reconstruction: The disassembly and re-assembly of equipment, beyond normal repair and servicing, generally for the purpose of placing the equipment back into full operation and substantially extending the service life contemplated at the time of original manufacture.

3.69 recyclable materials: Materials that because of their physical properties, characteristics or other intrinsic value can be reused, reprocessed, or converted for other uses or products after their original design use has been completed, and which have been diverted, removed or recovered from commercial, industrial, or residential wastes.

3.70 recycling: A series of operations or processes by which wastes or other materials are collected, separated, processed and returned to use as other products.

3.71 refuse: Any type of solid waste (except human wastes), including garbage, rubbish, ashes, incinerator residues, street cleanings, plant trimmings, and residential, commercial, and industrial solid wastes, including recyclable materials.

3.72 repair: Any replacement, substitution, or overhaul of the original baler or components made in such a manner that the baler and functions of the repaired portions retain minimum design specifications established by the original manufacturer (not a modification).

3.73 residential waste: Waste produced by single and multi-family residences.

3.74 safety signs: Signs meeting the Occupational Safety & Health Administration (OSHA) requirements used to depict three levels of hazards:

- a) "DANGER" — indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations,
- b) "WARNING" — indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury, and
- c) "CAUTION" — indicates a potentially hazardous situation, which if not avoided, may result in minor to moderate injury. It may also be used to alert against unsafe practices.

3.75 service opening: A protected opening into the interior of the baler that is designed to permit access to the interior for the purpose of service, repair, or maintenance, but not of a size to permit a person to pass through.

3.76 shall: Use of this word in this standard denotes a mandatory requirement.

3.77 should: Use of this word in this standard denotes a recommendation that is a sound safety practice; it does not denote a mandatory requirement.

3.78 start-up alarm: An audible and visible alarm distinctive and recognizable as a signal to provide warning that the baler will begin to operate.

3.79 sustained manual pressure control: A control that requires continuous pressure by the operator to allow the baler to operate.

3.80 system: The combined use of several technologies, normally stand-alone, in an integrated fashion for the simultaneous or sequential processing of materials (such as, shredders, trommels, conveyors, etc).

3.81 system pressure: The range of operating pressures ranging between normal and maximum operating pressure in the hydraulic system as stated by the manufacturer.

3.82 unattended baler with automatic startup: Baling equipment where the main motor will start and the baler will cycle automatically while unattended when activated by a signal from a sensor or a sequencing program or device.

3.83 waste: Any type of solid wastes (except human wastes) such as garbage, trash, rubbish, ashes, incineration residue, street cleanings, plant trimmings, solids, semi-solids, liquids or gases, or the like which are generated and discarded by commercial, industrial, and residential activities. Excluded are solid or dissolved materials such as domestic sewage and solid or dissolved materials in irrigation return flows or industrial discharges. This definition does include material diverted from the waste stream for the purpose of recycling.

3.84 working surface: Any surface on which employees perform job duties or upon which employees are required to work while performing assigned tasks.

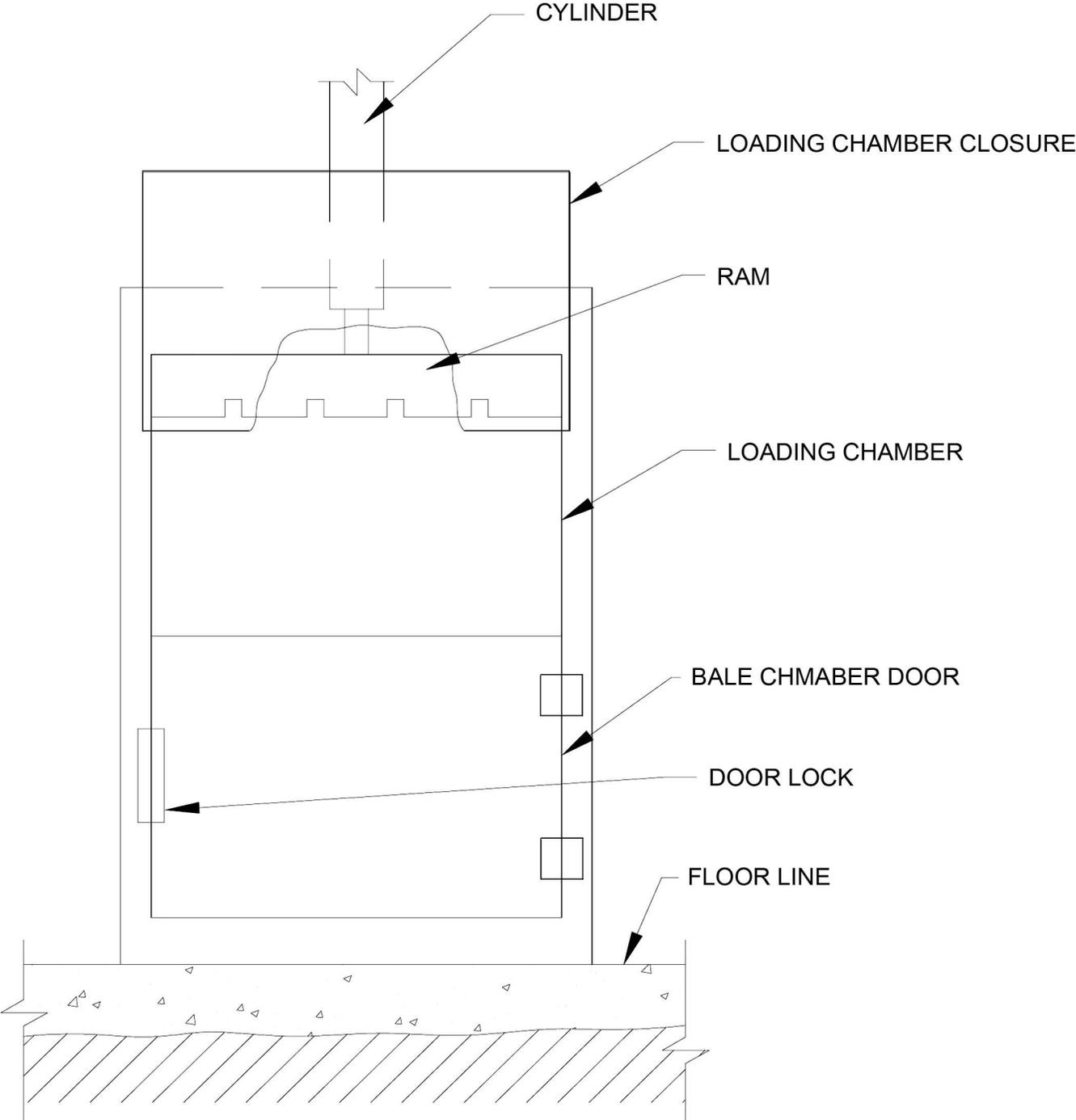


Figure 1 – Vertical Downstroke Baler

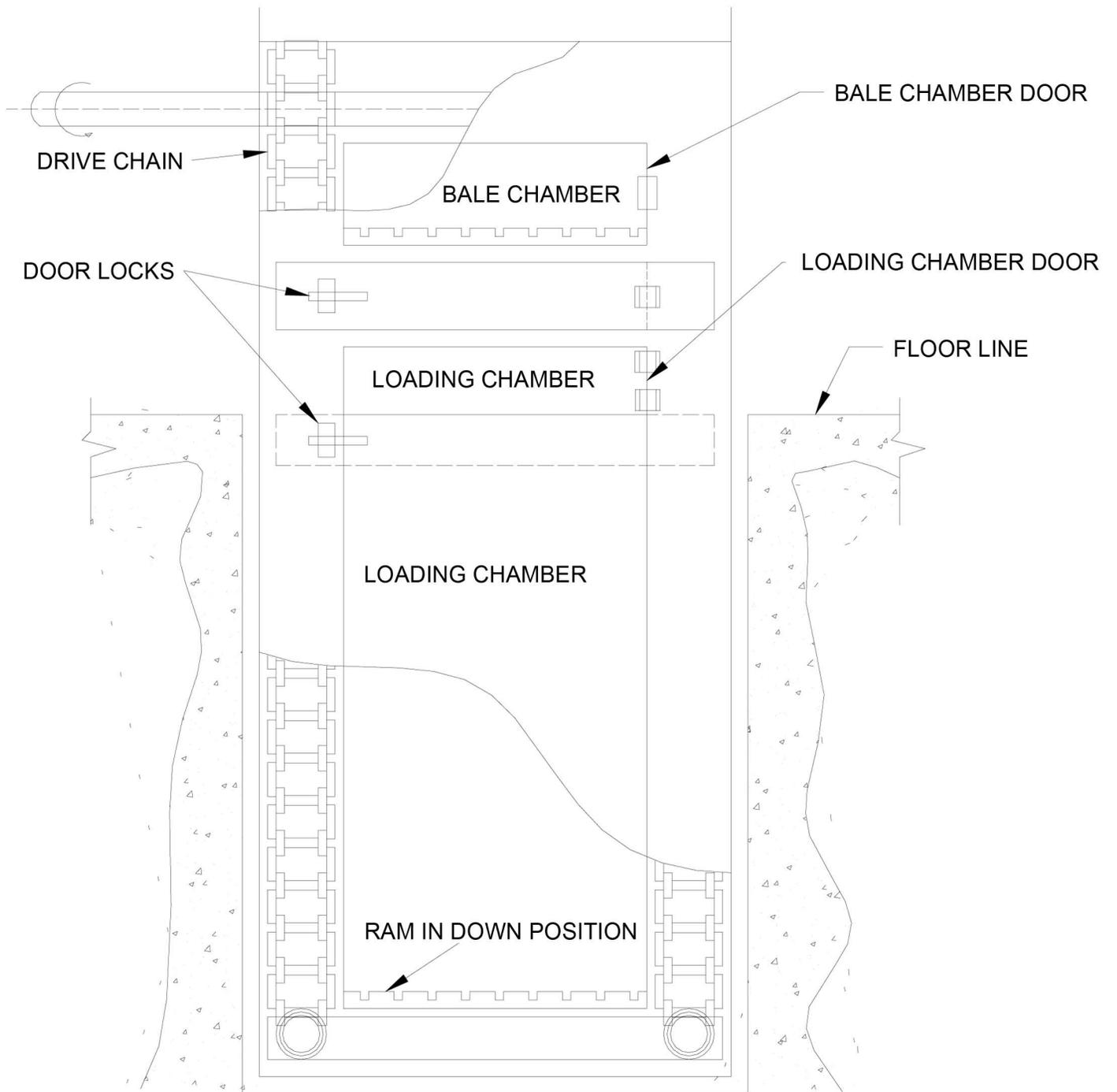


Figure 2 – Vertical Upstroke Baler (Chain Driven)

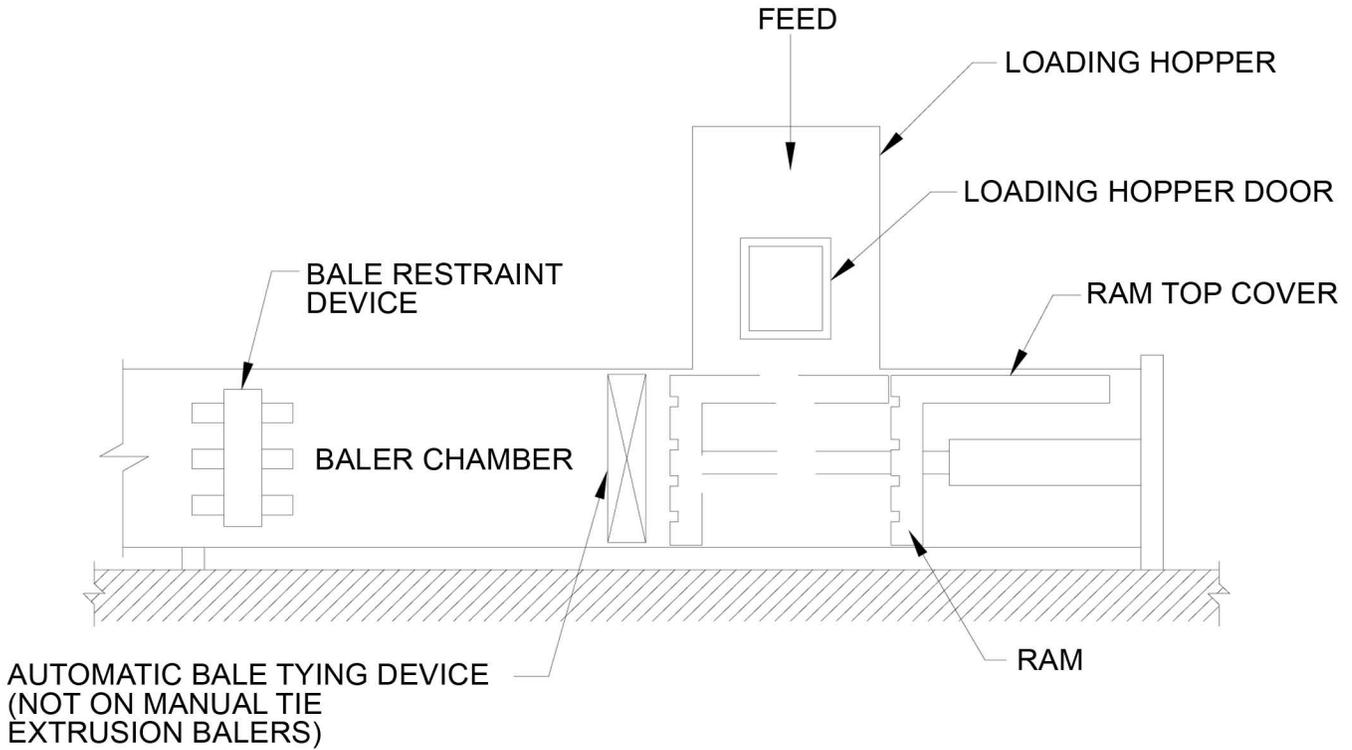


Figure 3 – Horizontal Extrusion Baler

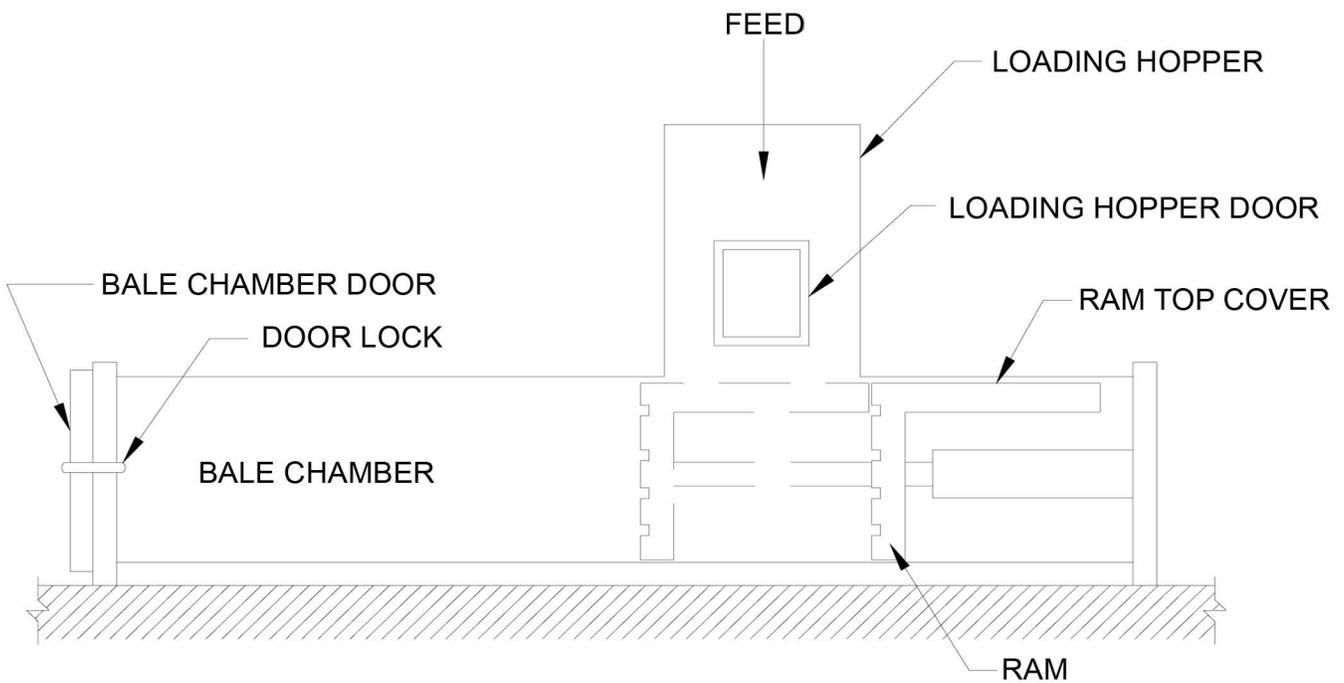


Figure 4 – Horizontal Closed-Chamber Baler

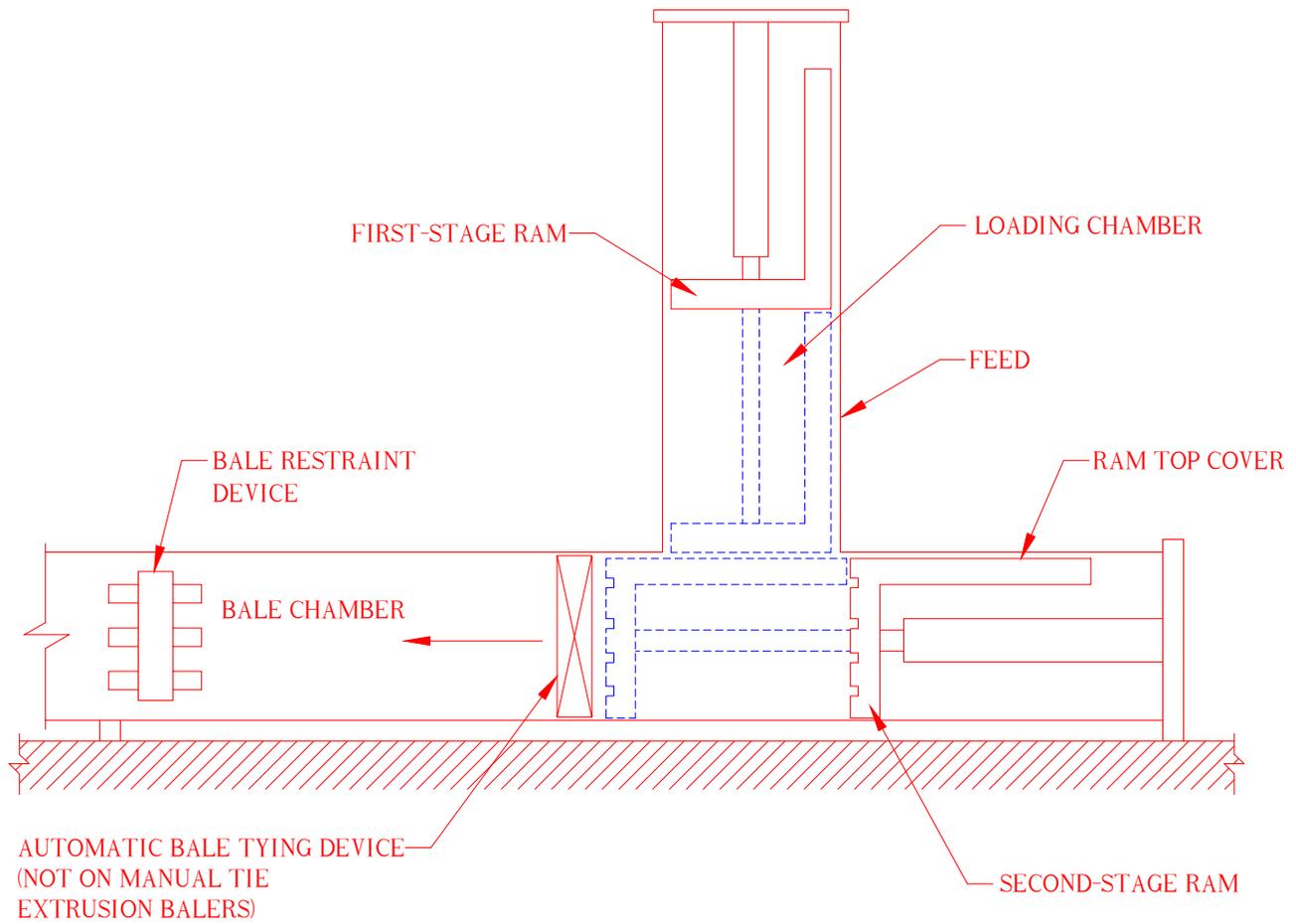


Figure 5 – Two-Stage Vertical-Horizontal (Continuous) Extrusion Baler

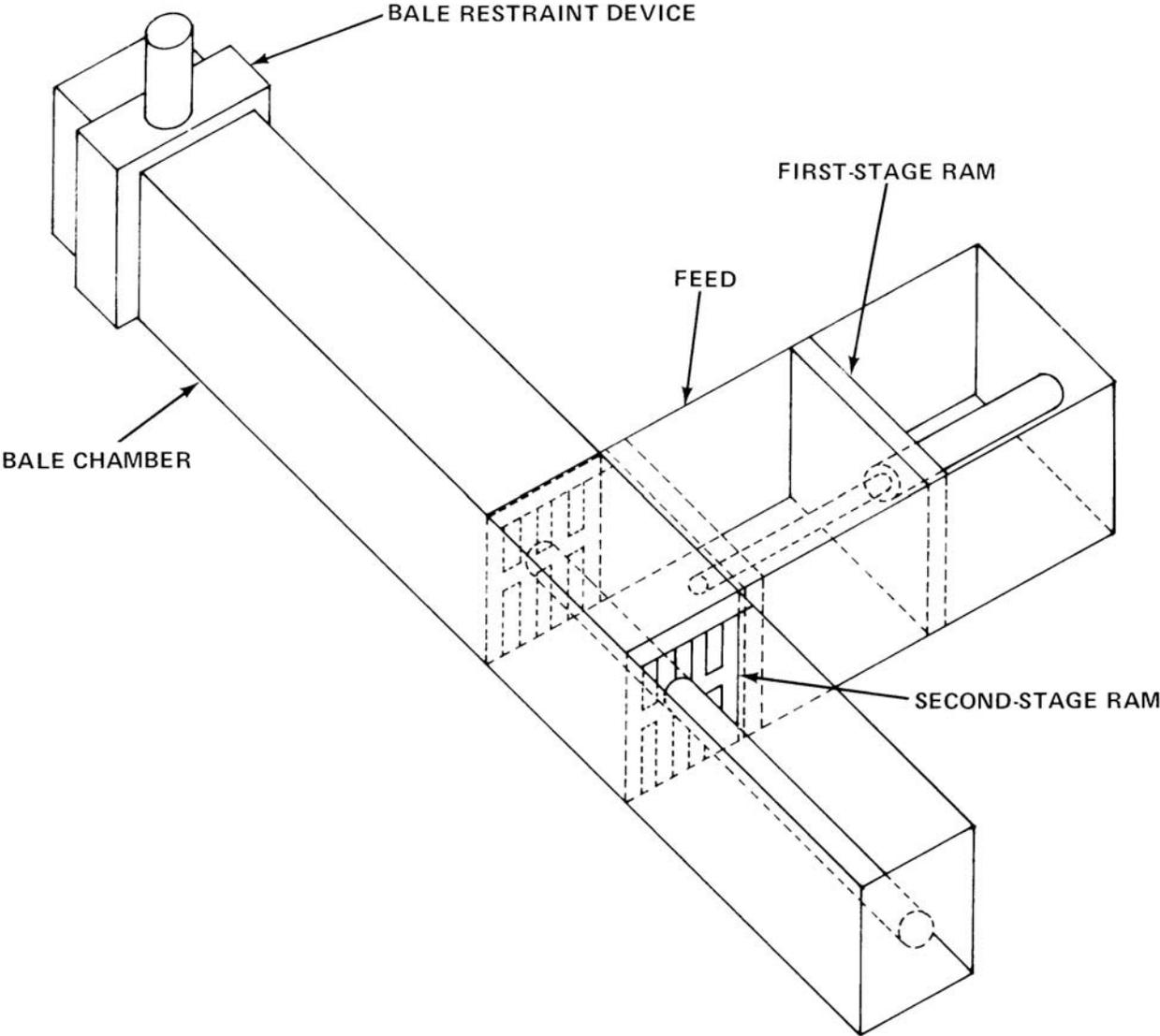
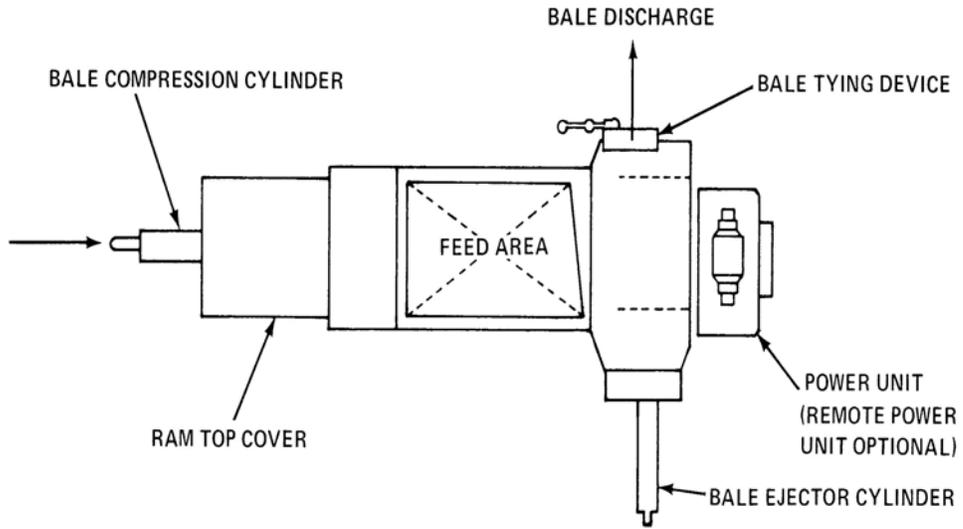
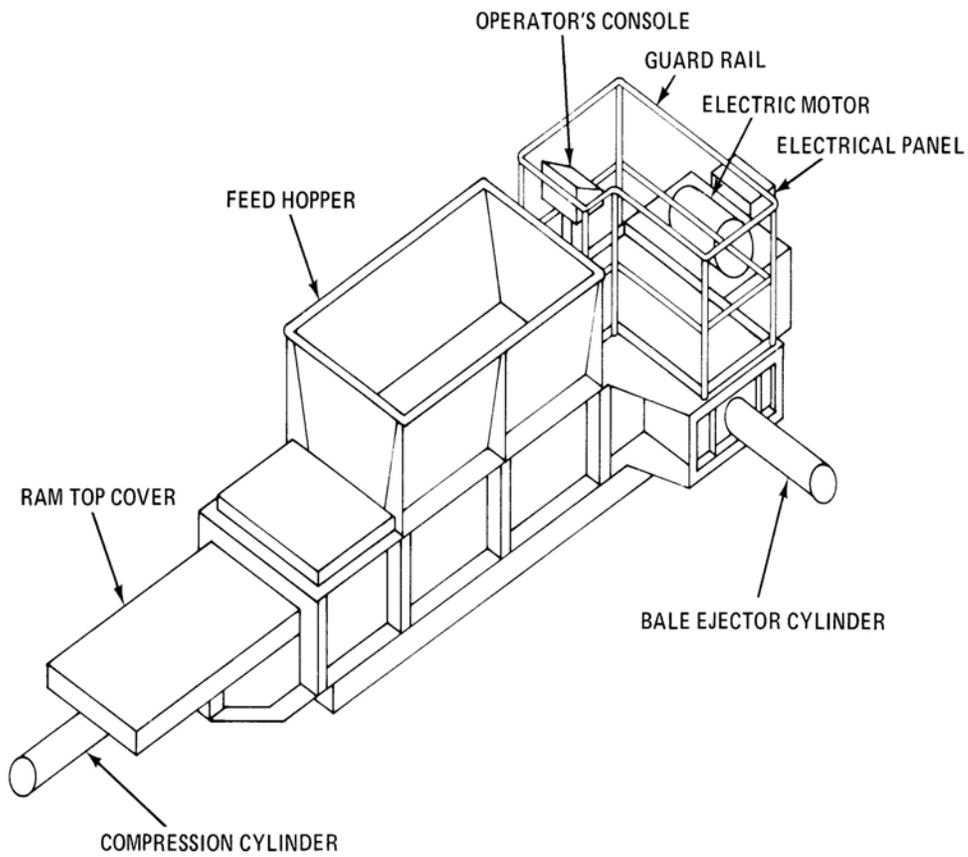


Figure 6 – Two-Stage Horizontal Baler (Two Compression Strokes)



(a)
Top View



(b)
Isometric View

Figure 7 – Two-Stage Horizontal Baler With Single-Compression Cylinder

4 Installation requirements

4.1 General requirements

4.1.1 The installer of balers shall do so in accordance with the appropriate sections of this American National Standard and ANSI Z245.51, applicable codes, local ordinances and the manufacturer's recommendations, and shall affix to such equipment the date of installation, installer's name and a statement attesting to compliance with this standard.

4.2 Power disconnect

4.2.1 Installation shall include a power disconnecting means that can be locked in the "off" position.

4.3 Emergency controls

4.3.1 Emergency stop controls shall be readily accessible to the operator or shall be located within 3 ft (91.4 cm) of the point of operation, the material feed area, or if chute fed, within 3 ft (91.4 cm) of the access door.

4.3.2 An electrical power disconnect shall be located within sight of, and no more than 50 ft (15 m) away from the main control panel.

5 Safeguards and features

5.1 Access covers

5.1.1 Access covers shall be interlocked, secured by a lockable device, or be removable by the use of hand tools only.

5.2 Service openings

5.2.1 Removable covers shall protect service openings that expose pinch points. The covers shall be interlocked, secured by a lockable device or removed by the use of hand tools only.

5.3 Controls

5.3.1 Each control shall be clearly and conspicuously labeled as to its function.

5.3.2 Operating controls, such as start buttons, shall be designed and located to prevent unintentional activation.

5.3.3 Stop buttons, including emergency stop buttons, shall be red, distinguishable from all other controls by size and color, and shall not be recessed.

5.4 Operating switches and sensors

5.4.1 When the unintentional operation of a switch results in a risk of injury to persons, the actuator of the switch shall be located or guarded so that unintended operation is unlikely.

5.4.2 When guarding is utilized for the actuator of the switch, it shall be by recessing, ribs, barriers, or the like.

5.4.3 The actuator of an interlock switch shall be located so that unintentional operation is unlikely.

5.4.4 A device that starts a baler automatically, such as a timer, an automatically reset overload-protective device, or the like, shall not be employed unless it utilizes a startup alarm.

5.5 Security switch

5.5.1 A key-lock on-off switch, or similarly functioning security switch, shall be provided by the manufacturer as a means to disconnect power to the operating controls and lock these controls in the "off" position.

5.6 Emergency controls

5.6.1 For emergencies, a safety retract feature shall be provided such that whenever the unit is shut off and started again, the ram will always retract to its rear position, or a means of stopping and controlling the movement of the ram at any point shall be provided.

NOTE: Emergency stop controls are to be readily accessible to the operator or are to be located within 3 ft (91.4 cm) of the point of operation or the material feed area. If chute fed, the emergency stop controls are to be within 3 ft (91.4 cm) of the access door.

NOTE: An electrical power disconnect is to be located within sight of, and no more than 50 ft (15 m) away from, the main control panel.

5.7 Interlocks

5.7.1 Access door(s) of loading chambers shall have an interlock system that prevents cycling motion while the access door(s) is open.

5.7.2 An interlock shall not be readily defeated without intentional purpose, such as by:

- a) Damaging of the interlock;
- b) Making wiring connections or alterations; or
- c) The use of tools or other materials (such as magnets and wedging devices)

5.7.3 An interlock shall not be capable of being defeated by materials such as wood, metal chips or debris that could accumulate in normal use.

5.7.4 When movement of a guard actuates an interlock, the arrangement shall be such that the guard is in place when the interlock is in the position that permits operation of the parts being guarded.

5.8 Guarding

5.8.1 Protection of personnel from contacting moving parts at the point of operation shall be provided by one of the following methods or by other means as effective as the following means:

- a) The installation of a guard or loading hopper with a minimum loading height above the working surface of 42 inches (106.7 cm) (dimension "Y"), and the sum of dimensions "X" and "Y" equaling 84 inches (213.4 cm) or greater (see figure 8), that shall prevent any person from contacting moving parts at the point of operation; or
- b) The installation of an access gate or door that is interlocked in such a manner as to prevent the movement of parts at the point of operation when the gate or door is open; or

- c) Sustained-manual-pressure controls located in such a way that the operator cannot reach the point of operation and within an area fully visible to the operator of the complete point-of-operation area when a guard is not used.

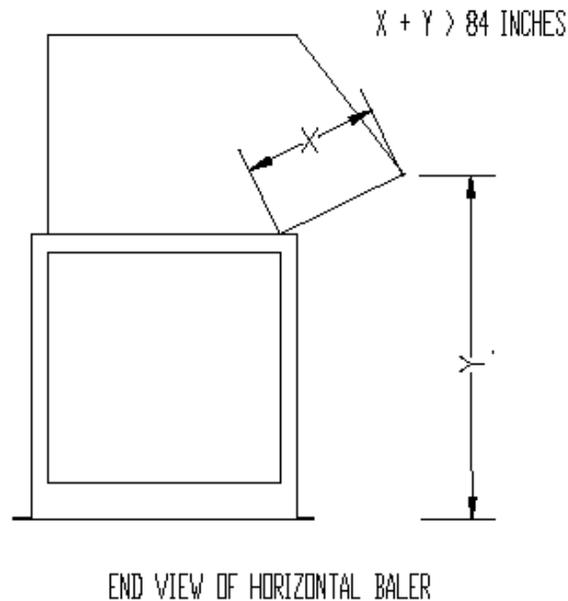


Figure 8 – Guard or loading hopper - minimum loading height for balers

5.9 Container/cart lifting systems

5.9.1 General

5.9.1.1 Container/cart lifting systems for balers shall be installed in accordance with the manufacturer's instructions.

5.9.1.2 Controls for container/cart lifting systems, except for those stated in 5.9.3, shall be of the sustained-manual-pressure type, and located outside the area of operation of the lifting system and container, such that the operator can not activate the controls while standing under a raised container, and in direct line of sight of the lifting operation.

5.9.1.3 Safety check valves in the hydraulic system or mechanical lock systems shall be provided to hold the lift in its position should a failure occur with a lifting system hydraulic hose.

5.9.2 Container/cart lifters

5.9.2.1 Lifters for containers/ carts provided with balers, or marketed separately and recommended by the manufacturer for use with the baler, shall conform to the following requirements:

- a) The lifter must be compatible with the type(s) of containers/carts it is to cycle;

NOTE: If an operator attempts to use a lifter to cycle containers/carts for which it was not designed, this may result in an unsafe condition or damage to the cart.

- b) A minimum cycle time for the lifter shall be specified and the lifter cycle time shall be capable of being adjusted only by the use of a tool;
- c) Upon release of pressure on the operating device by the operator, the lifter shall stop and hold at its current position in the cycle;
- d) The control shall be capable of reversing the direction of motion of the lifter at any point in the cycle;
- e) Controls shall be located so as to prevent inadvertent operation of the lifter.

NOTE: There may be more than one set of controls.

- f) The normal position for an operator using the controls shall not place the operator underneath a raised container or cart;
- g) Control levers shall be designed such that they are pulled to raise, and pushed to lower and shall be marked to indicate function;
- h) Push button controls shall be arranged with the "raise" button higher than the "lower" button and shall be marked to indicate function; and
- i) The lifter shall be equipped with a device to secure the container/cart to the lifter during the lifting cycle.

5.9.3 Automatic container/cart lifting systems

5.9.3.1 Automatic container/cart lifting systems shall have the point of operation and area through which the container moves completely enclosed by guards, a cage, or other similar devices with interlocked access that prevent entry or operation when not in place.

5.9.3.2 Automatic container/cart lifting systems shall have an emergency stop control. (see Note in 5.6)

5.10 Start-up alarms

5.10.1 Audible and visual alarms

5.10.1.1 Any audible alarm shall be a pulsing or intermittent signal and shall be adjustable to at least 10 dBA above the ambient noise level. An automatically adjustable audible signal shall be capable of producing at least 10 dBA above the ambient noise level.

5.10.1.2 Any visible alarm shall be a flashing or pulsating type.

5.10.2 Initial start-up cycle alarms

5.10.2.1 Balers shall have a minimum 20-second audible and visual start-up alarm sequence before the main motor/motors can start. The start-up alarm sequence shall include a minimum of 5 seconds of audible and visual alarms followed by a minimum of 15 seconds of the visual alarm.

Exception: Vertical balers that are fully enclosed such that 1) no body part can come in contact with any moving part, 2) the ram/rams only cycle one time, and 3) the cycle is initiated by a manual control by the operator do not require an initial start start-up alarm

5.10.3 Continuous/automatic start-up alarm for automatic balers

5.10.3.1 A horizontal baler with an automatic starting control circuit shall have a start-up alarm that is activated when the baler is started or when the automatic starting control circuit is activated.

5.10.3.2 The start-up sequence shall be completed before the ram(s) move, in either the automatic or manual mode.

5.10.3.3 If the automatic starting control circuit becomes interrupted, the circuit shall not reactivate until a new start-up sequence has been completed.

5.10.4 Start-up time delay

5.10.4.1 Continuously operating balers and unattended balers with automatic startup shall have a minimum time delay of 20 seconds from the time the switch controlling the automatic starting control is initiated until the automatic starting control circuit is energized.

5.10.4.1.1 The switch shall be maintained in the actuating position for the entire 20-second delay in order to energize the automatic starting control circuit.

5.10.4.1.2 If the switch controlling the automatic starting control circuit is released before the end of the 20-second delay period, the automatic starting control shall not be energized.

5.10.5 Warning alarm

5.10.5.1 Continuously operating balers and unattended balers with automatic startup shall have a visible warning alarm that is activated as long as the automatic starting control system is energized.

NOTE: The warning alarm may be the same alarm used for the start-up alarm in 5.10.1.

5.10.6 Emergency stop controls, interlock interrupts and automatic starting control circuits

5.10.6.1 When actuated, emergency stop controls shall stop the baler motor and disable any automatic starting control circuit.

5.10.6.2 For balers with automatic starting control circuits, the baler shall not automatically restart when the emergency stop control is reset. The baler shall not restart until the automatic starting control circuit has been manually reset (energized) to initiate a normal startup sequence with startup alarm and startup time delay.

5.10.6.3 For balers with automatic starting control circuits, the baler shall not automatically restart when the access door or gate is closed (interlock re-engaged). The baler shall not restart until the automatic starting control circuit has been manually reset (energized) to initiate a normal startup sequence with startup alarm and startup time delay.

5.10.6.4 For balers with automatic bale tying devices, an emergency stop button shall be provided at the tying device.

5.10.7 Automatic starting control circuit

5.10.7.3 The automatic control circuit shall be de-energized when power is removed from the baler.

5.10.7.4 For balers with automatic starting control circuits, the baler shall not restart automatically when electrical power is supplied until the automatic starting control circuit has been manually reset (energized).

5.11 Vertical downstroke balers – additional safety features**5.11.1 Bale chamber door(s)**

5.11.1.1 The ram shall not move unless the bale chamber door(s) is fully closed and latched, except when operated with a sustained-manual-pressure control.

5.11.2 Loading chamber closure

5.11.2.1 A loading chamber closure shall be provided.

5.11.2.2 The loading chamber closure shall completely cover the loading chamber before the ram can be activated into its compression stroke. The loading chamber closure must remain in place until the completion of the compression stroke, or will open with the raising of the ram, but not as to allow any pinch points or hazards to be exposed.

5.11.2.3 If the loading chamber closure does not have an automatic opening feature, then the ram shall stop or return to its rest position if the loading chamber closure is opened more than ½ inch (13 mm) at any time during the compression stroke. Unless otherwise designed to eliminate the pinch point, or equipped with a sustained-manual-pressure control, balers shall be equipped with a mechanical or electrical interlock to prevent the closure from being opened faster than the baler ram, so as to prevent operator access to the top of the ram during its upward motion.

5.11.2.4 If the loading chamber closure does have an automatic opening feature at the completion of the compression stroke, then the baler shall have a mechanical or electrical interlock to prevent the closure from being raised faster than the baler ram motion to prevent operator access to the top of the baler ram during its upward motion, or be otherwise designed to eliminate the pinch point.

5.11.3 Bale chamber door locking mechanism

5.11.3.1 Locking mechanisms for bale chamber door(s) shall be designed to allow for controlled relief of pressure as the door(s) is opened.

5.12 Vertical upstroke balers – additional safety features**5.12.1 Ram compression stroke interlock**

5.12.1.1 An interlock shall be provided to keep all doors closed during the ram compression stroke.

5.12.2 Ram guard

5.12.2.1 A guard for the ram shall be provided between the ram and the floor line of the baler pit in an upstroke baler. (See figure 2.)

5.12.3 Baler chamber door locking mechanisms

5.12.3.1 Locking mechanisms for bale chamber door(s) shall be designed to allow for controlled relief of pressure as the door(s) is opened.

5.13 Horizontal balers – additional safety features

5.13.1 Baler loading hopper access doors

5.13.1.1 Baler loading hopper access door(s) shall be equipped with a control circuit interrupt, which must reset the baler start-up cycle, to prevent baler operation with the door open.

5.13.2 Bale chamber door closure

5.13.2.1 An interlock shall be provided on all closed-chamber horizontal balers to ensure return of the baling ram face into the loading chamber area before the manually operated bale chamber door opening mechanism is activated, or the door opening mechanism shall be designed to allow for controlled relief of the pressure against the door as it is manually opened.

5.13.3 Baler loading chamber closure

5.13.3.1 On horizontal balers not equipped with a loading hopper, the loading chamber closure shall completely cover the loading chamber before the ram can be activated in its compression stroke. The closure shall remain in place until completion of the compression stroke. If during the compression stroke the closure is moved from its fully closed position, the ram shall stop.

5.13.4 Ram top cover

5.13.4.1 The top of the ram on all horizontal balers shall be covered to prevent access to the backside of the ram face as it extends into the loading chamber. When the ram is fully extended, the ram cover shall cover the full length and width of the loading chamber opening.

5.14 Caution, warning and danger markings

5.14.1 Baling equipment or a separately packaged attachment having a hidden or unexpected risk of injury to persons shall be marked to inform the user of the risk.

5.14.2 All cautionary, warning, danger, and operator markings shall be located on or immediately adjacent to each automatic sensing device and at the point of operation.

5.14.3 A caution, warning, or danger marking shall be permanent and legible and shall be located on a permanent part of the baler.

5.14.4 A cautionary marking intended to instruct the operator shall be legible and visible from the position normally assumed by the operator when starting the baler or from the position normally assumed for the specific operation involved. Other such markings for servicing or making settings and adjustments shall be legible and visible to the individual when such work is being accomplished.

5.14.5 A marking intended to inform the user of a risk of injury to persons shall be prefixed by a signal word "CAUTION," "WARNING," or "DANGER." The marking shall be in letters not less than 0.672 inches (17.07 mm) high. The signal word shall be more prominent than any other required marking on the baling equipment.

5.14.6 Markings shall be color coded as follows:

"DANGER" - Red, or predominantly red, with lettering or symbols in a contrasting color.

"WARNING" - Orange, or predominantly orange, with lettering or symbols in a contrasting color.

"CAUTION" - Yellow, or predominantly yellow, with lettering or symbols in a contrasting color.

NOTE: Additional guidance for markings can be found in ANSI Z535.4-2002.

5.14.7 A baler having a part of an enclosure that is removable without the use of a tool (to attach, to make an operating adjustment, or for other reasons) shall be marked to indicate that such servicing is to be done with the equipment disconnected from the supply circuit.

5.14.8 A baler having provisions for two or more separate connections to a branch circuit or other power-supply source shall be permanently marked with the word "**CAUTION**" and the following or the equivalent: "**This baler has more than one connection to the source of supply. To reduce the risk of electrical shock, disconnect all such connections before servicing.**" The marking shall be located at each point of connection, and shall be readily visible after installation of the baler.

5.14.9 All signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard.

5.14.10 A sign shall be located on or immediately next to each automatic sensing device, and at the point of operation, such as:

"WARNING — THIS BALER STARTS AUTOMATICALLY"

5.14.11 Where voltage exceeds 120 volts, a sign shall be located on each control panel and power unit, such as:

"DANGER — HIGH VOLTAGE" (or appropriate voltage)

5.14.12 A sign shall be located on each access cover, such as:

**"WARNING — DO NOT REMOVE ACCESS COVER EXCEPT FOR SERVICING;
FOLLOW LOCKOUT/TAGOUT PROCEDURES"**

5.14.13 A sign shall be located on each access gate that prohibits access to the loading chamber from a walk-on ramp, such as:

"WARNING — GATE MUST BE CLOSED BEFORE OPERATING BALER"

5.14.14 A sign shall be located on any inside face in the loading hopper, which is visible from a loading position, such as:

"DANGER — DO NOT ENTER"

5.14.15 A sign shall be located on each outside face of the loading hopper, such as:

"DANGER — DO NOT ENTER"

5.14.16 On commercial/industrial balers without a loading hopper, a sign shall be located at the loading sill(s) such as:

"DANGER — DO NOT ENTER"

This sign shall be visible from both sides of the baler.

5.14.17 Container/cart lifting systems

5.14.17.1 A sign shall be located in the vicinity of the lifting system controls, such as:

"WARNING — BEFORE OPERATING LIFTER, CLEAR AREA OF ALL INDIVIDUALS"

A sign shall be located in clear view of the dumper system and container, such as:

"DANGER — STAY CLEAR OF LIFTER AND LIFTING AREA"

5.14.18 Balers containing one or more confined spaces meeting the criteria of " confined space"

5.14.18.1 A sign shall be located at or near the entrances to those confined spaces for which hazardous energy control procedures are provided, such as:

"WARNING – FOLLOW LOCKOUT/TAGOUT PROCEDURES BEFORE ENTERING"

5.14.18.2 A sign shall be located at or near the entrances to those confined spaces for which hazardous energy control procedures are provided, such as:

"DANGER — CONFINED SPACE"

6 Reconstruction and modification

6.1 Reconstruction or modification of any baler (including power units and controls) shall be in accordance with requirements of ANSI Z245.51.

6.2 Reconstructed or modified balers shall be permanently identified with the name of the manufacturer or person conducting the reconstruction or modification and the date of reconstruction or modification.

6.3 Reconstructed or modified balers evaluated and determined to conform to the requirements of ANSI Z245.51 shall be identified on the baler by a statement attesting to compliance with the ANSI Z245.51 standard or shall have an approved listing mark.

7 Operational requirements

7.1 **Owner/employer responsibilities for balers.** The owner/employer shall provide properly maintained balers that meet all applicable regulatory safety requirements and the requirements of this standard, and shall be responsible for all of the following:

- a) Ensuring that the installation of the baler conforms to local codes, ordinances, and manufacturer's recommendations. If installing into a system, examine prevailing safety standards of associated equipment;
- b) Providing to employees instruction and training in safe work methods before assigning them to operate, clean, service, maintain, modify, or repair the baler. Such instruction and training shall include procedures provided by the manufacturer. The employer will maintain records as to the names of employees and the dates of training;
- c) Providing instructions for addressing abnormal situations (e.g., bridging of the loading chamber or feeding chute, jam of materials);

- d) Assigning only trained employees to work on (which includes operating, loading, cleaning, servicing, maintaining, or repairing) the baler;
- e) Monitoring the employee's operation of the baler and taking appropriate action to ensure proper use, including adherence to safe practices and the employee requirements of this standard and monitoring the employee's operation of balers and taking appropriate action to ensure proper use of equipment, including adherence to safe practice;
- f) Repairing, prior to placing the baler into service, any mechanical malfunctions or breakdowns that affect the safe operations of the baler;
- g) Establishing and following a program of periodic and regular inspections of all balers to ensure that all parts, component equipment, and safeguards are in safe operating condition, and adjusted, in accordance with the manufacturer's recommended procedures. This shall include keeping all malfunction reports and records of inspections and maintenance work performed;
- h) Implementing a program for the maintenance of the baler which will incorporate the following elements:
 - 1) Requirements for trained, competent maintenance employees or contractors to perform inspection and repair work;
 - 2) Providing for the cleaning, inspection and repair of the baler in accordance with the manufacturer's recommendations, including periodic maintenance;
 - 3) Ensuring that all required safety features are operational and functioning, and repairing, prior to placing into service, any reported malfunction or defect that affects the safe operation of the baler; and
 - 4) Ensuring that all caution, warning and danger markings required by 5.14 are installed and legible, or are replaced if damaged, defaced or missing.
- i) Utilizing the manufacturer's recommended procedures for the control of hazardous energy sources (lockout/tagout) in a program complying with Part 1910.147 of Title 29 of the *Code of Federal Regulations* (OSHA) (see 7.3);
- j) Utilizing the manufacturer's recommended procedures for access control for permit-required confined spaces as part of the employer's program (see 7.4);
- k) Protecting any person by one of the methods in 5.8.1, or by other means as effective as those means of protection.
- l) For balers fed by means of a loading pit conveyor, reciprocating floor, or push pit that is flush with or below the facility floor, providing:
 - 1) Protection for employees by means of:
 - i) Limiting access within 6 feet (183 cm) of the edge of the pit to authorized employees;
 - ii) Training authorized employees to recognize and avoid the hazards associated with the pit area;

- iii) Requiring that others whose employees use the pit area provide assurance of such training; and
- iv) Limiting access by unauthorized persons by installing signs, such as:

"RESTRICTED AREA — AUTHORIZED EMPLOYEES ONLY"

- 2) Providing a device to the extent practicable, which prevents trucks or other motor vehicles that unload directly into the loading pit from rolling into the pit;
- m) When balers equipped with automatic start/cycling controls are provided, allowing their use only in locations where a startup alarm is utilized or it is demonstrated that automatic starting does not result in a risk of injury to persons;

NOTE: Achieving acceptably low risk of injury would include demonstrating that lockout procedures are strictly adhered to when bridging in feed chutes occurs or jammed material must be cleared from the loading chamber

- n) Providing guard railings for dock ramps that meet U.S. Occupational Safety and Health Administration requirements. These shall be located around the loading chamber opening if walk-on ramps are used to deposit refuse into the loading chamber. Guard railings and toe boards shall be provided on the sides of docks and ramps;
- o) Providing for an adequate work area around the baler for safe maintenance, servicing, and cleaning procedures;
- p) Keeping all surrounding walking areas and floors free from obstructions, and accumulations of waste matter, grease, oil, and water (slipping and tripping hazards);
- q) Maintaining records or employee reports of malfunctions;
- r) Specifically inspecting safety interlocks, switches, and other protective devices to ensure that these devices are not disabled or bypassed, and not to permit the baler to be operated unless these devices are fully functional. These inspections shall be in accordance with (g);
- s) Ensuring that containers supplied are capable of withstanding the maximum forces generated by the baling system;
- t) Ensuring that loaders are aware of hazards and safety requirements;
- u) Ensuring that only authorized employees (18 years old or older) operate, inspect, or maintain balers;
- v) Ensuring that only authorized employees (16 years old or older) load, but do not operate balers; and
- w) Incorporating balers into the employer's safety program (see Section 8).

7.2 Operator and employee responsibilities. Operators who work on and around the baler shall be responsible for the items listed below:

- a) Using all applicable safety features provided on the baler;
- b) Using the baler only after receiving instruction;

- c) Reporting any damage to, or malfunction of, the baler by submitting a report to the employer or responsible authority when the damage or malfunction occurs;
- d) Ensuring that access doors and service opening covers are in place, secure, and/or locked before operations begin;
- e) Ensuring that the area of operation around container/cart lifting systems and the container will be clear of persons during all phases of the lifting operation prior to energizing the dumping system;
- f) Ensuring that all persons are clear of the baler point of operation before actuating any compaction cycle controls or container/cart lifting system controls and being prepared to stop the compaction cycle or container dumping operation if necessary;
- g) Ensuring that all persons are clear of the tailgate (on baler-container combinations so equipped) before the tailgate is opened or shut. The operator shall warn all persons not to cross behind or under an open tailgate;
- h) Using the baler in accordance the manufacturer's instructions, including ensuring the proper position of all locks, doors, guards, etc.;
- i) Ensuring that no one disables or bypasses safety interlocks, switches, or other protective devices and that the baler is not operated unless these devices are fully functional;
- j) Locking out the unit when inspecting malfunctions, jams, or other problems arising from daily operations; servicing; or performing maintenance (except maintenance testing). The affected employee shall identify the type and magnitude of the energy that the baler uses, shall understand the hazards, and know the methods to control the energy (see 7.3);
- k) Coupling and securing a compatible container to a baler frame as specified by the baler and container manufacturer(s);
- l) Operating, inspecting, and maintaining the baler only if 18 years old or older and after being properly instructed and trained; and
- m) Loading, but not operating, the baler only if 16 years old or older.

7.3 Procedures for the control of hazardous energy sources (lockout/tagout)

7.3.1 The owner/employer shall have a hazardous energy control (lockout/tagout) procedure to follow when performing servicing and maintenance on balers where the unexpected energization or start up of equipment, or release of stored energy could cause injury to employees.

7.3.2 The owner/employer shall utilize the instructions provided by the manufacturer for the control of hazardous energy sources. The lockout/tagout procedure shall isolate and render safe all energy sources, including electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other potential energy sources (e.g., gravity, kinetic, etc.). It shall be used to ensure that the baler is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the baler or release of stored energy could cause injury.

7.3.3 The lockout/tagout procedure shall include but is not limited to the following:

- a) Shutting down all power sources;

- b) Removing keys or other devices that enable the baler;
- c) Using a lock to secure the power supply or, if that is not feasible, installing a tag on an appropriate location, using a non-reusable fastener, or installing a similar warning device;
- d) Placing operating components in such a position so as not to be subject to possible free fall and/or installation of additional blocking devices to prevent such free fall of any raised or elevated component; and
- e) Relieving stored hydraulic or pneumatic pressure, after blocking devices are installed, if maintenance is to be done to the hydraulic or pneumatic system.

7.3.4 The procedure shall address the following:

- a) Sequence of lockout for the baler:
 - 1) Notify all affected employees that servicing or maintenance is required on a baler and that the baler must be shut down and locked out to perform the servicing or maintenance.
 - 2) The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the baler utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
 - 3) If the baler is operating, it must be shut down by the normal stopping procedure (depress stop button, open switch, close valve, etc.).
 - 4) De-activate the energy isolating device(s) so that baler is isolated from the energy source(s).
 - 5) Lock out the energy isolating device(s) with assigned individual lock(s).
 - 6) Stored or residual energy must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
 - 7) Ensure that the baler is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position only after verifying the isolation of the equipment.

NOTE: The machine or equipment is now locked out.

- b) Restoring the baler to service. When the servicing or maintenance is completed and the baler is ready to return to normal operating condition, the following steps shall be taken:
 - 1) Check the machine or equipment and the immediate area around the machine or equipment to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
 - 2) Check the work area to ensure that all employees have been safely positioned or removed from the area.
 - 3) Verify that the controls are in neutral.

- 4) Remove the lockout devices and reenergize the machine or equipment.

NOTE: The removal of some forms of blocking may require re-energizing of the machine before safe removal.

- 5) Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

7.4 Procedures for work in confined spaces

7.4.1 The owner/employer shall have a written procedure for work in confined spaces meeting the criteria of "permit required confined spaces," such as integrated power units. The procedure shall utilize the manufacturer's instructions for the hazardous energy control (lockout / tagout) procedure which shall isolate and render safe all energy sources, including electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other potential energy sources (e.g., gravity, kinetic, etc.). which may create a hazard during entry into each of those confined spaces.

- a) These instructions shall include the requirement to affix a sign to the baler, at or near the entrances to those confined spaces for which hazardous energy control procedures are provided, such as, "**Warning — Follow lockout/tagout procedures before entering.**"

- b) These instructions shall include the requirement to affix a sign to the baler, at or near the entrances to those confined spaces for which hazardous energy control procedures are provided, such as, "**Danger — Confined Space.**"

8 Safety and training program

8.1 General

8.1.1 Employers shall evaluate and manage safety issues related to the operation of baling equipment as part of their safety program.

8.2 Safety program

8.2.1 The employer's program shall include at a minimum the following elements:

- a) A hazard assessment in which the employer conducts a review of the various types of baling equipment that the employer utilizes and the hazards associated with them and, review and assess the capabilities, qualifications and training of any person who may potentially encounter these hazards.
- b) An evaluation of the means and methods of controlling the hazards identified in the hazard assessment, including information such as industry and regulatory requirements; instructions for the operation, inspection, and maintenance of balers, and other information appropriate to the hazards that are identified
- c) A written program, based upon the hazard assessment and evaluation, to include procedures for the operation, inspection, and maintenance of balers, prohibited practices, record keeping, training requirements, and normative references to documents, such as operating manuals, that are relied upon and may be required as part of that program;
- d) A program, conforming to 8.3, for the implementation of the written program; and

- e) Periodic review and program revisions as necessary to ensure the effectiveness of the safety program.

8.3 General training

8.3.1 Employers shall ensure all employees, including supervisors, contract laborers, and all other persons engaged in the operation, cleaning, maintenance, service or repair of baling equipment are properly trained appropriate for their assigned jobs and tasks. Contractors who may be engaged to operate or maintain the employer's balers shall be advised of the unique hazards related to the equipment that may affect the activities in which the contractor's employees will engage.

8.3.2 Training frequency

8.3.2.1 Training shall be provided upon initial assignment to a job or task, with periodic refresher training to maintain the required level of competence. Retraining shall be provided for employees whenever their job assignments change, or an equipment change occurs that presents a new hazard. Additional retraining shall be provided whenever the employer has reason to believe, or periodic inspections reveal, that employee deviations from procedures have occurred, or inadequacies in the employee's knowledge of procedures become evident.

8.3.3 Instructional information

8.3.3.1 Employers are required to refer employees to, and have readily available, the manufacturer's instructions to ensure correct operating and maintenance procedures and work practices are understood and followed. Employers are required to ensure employees possess knowledge and skills to safely operate the baler.

8.3.4 Contract labor

8.3.4.1 Employers shall ensure for each job or task performed that training is provided either by the contract laborer's parent employer or by the employer.

8.3.5 Training records

8.3.5.1 Employers are required to maintain training records to include the date(s) of the training and the type of training received. Records are required to be maintained as required by applicable regulations. Contractors and contract laborers are required to provide the employer with appropriate training records upon demand.

8.3.6 Equipment-specific training

8.3.6.1 Training shall be tailored for individual operations and the type of equipment utilized including detailed, equipment-specific training for machine operators, as well as maintenance personnel and supervisors who must operate equipment as part of their job duties. Training shall include practical demonstration of equipment operation knowledge and skills by the employee, as appropriate to the requirements of the employee's job duties.

8.4 Training requirements

8.4.1 Training is required to include at a minimum:

- a) The necessary training as identified in the hazard assessment [see 8.2.1 a)];

- b) The training required by laws and regulations, such as those of federal and state Occupational Safety and Health Administrations, the Departments of Transportation, and other applicable regulatory agencies; and
- c) Operational instruction on each specific type of equipment used by the employee, including the instructions provided with the equipment.

Annex A
(informative)

Bibliography

A.1 American National Standards

ANSI A1264.1-1995 (R2002), *Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems*.

ANSI/NFPA 79-2002, *Electrical Standard for Industrial Machinery*

ANSI/NFPA 82-1998, *Incinerators and Waste and Linen Handling Systems and Equipment*

ANSI Z245.51-2004, *Baling Equipment — Safety Requirements*¹

ANSI Z535.1-2002, *Safety Color Code*

ANSI Z535.2-2002, *Environmental and Facility Safety Signs*

ANSI Z535.3-2002, *Criteria for Safety Symbols*

ANSI Z535.4-2002, *Product Safety Signs and Labels*

ANSI Z535.5-2002, *Accident Prevention Tags*

A.2 U.S. Government Health & Safety Regulations^{2,3}

OSHA 29 CFR Part 1910.23, *Guarding of Floor and Wall Openings and Holes*

OSHA 29 CFR Part 1910.132, *General Requirements for Personal Protection Equipment*

OSHA 29 CFR Part 1910.146, *Permit-Required Confined Spaces*

OSHA 29 CFR Part 1910.147, *Lockout/Tagout of Energy Sources*

OSHA 29 CFR Part 1910.212, *Machine Guarding*

A.3 Industry Standards

ASME B15.1-2000, *Mechanical Power Transmission Equipment*⁴

ASME B20.1-1996, *Conveyors and Related Equipment*

1 Available from Environmental Industry Associations

2 Available from U.S. Government Printing Office, Washington, DC

3 Available over the Internet from www.osha.gov

4 Available from American Society of Mechanical Engineers



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