



Department of Agriculture
Division of Rides and Amusements

TRACKLESS TOWED ATTRACTIONS
for Pennsylvania Restricted Inspector Certification

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Pennsylvania Amusement Ride - Trackless Towed Attraction Inspector Study Guide

Attraction Operator:

This study material has been compiled to help the applicant prepare for the Certified Amusement Ride Safety Inspector Test. This document does not include all the information required to answer all the questions on the test. The information in this document covers the essential areas of Amusement Ride inspections and should be helpful in preparing to become a certified inspector, as well as, for the test.

Regulations - It is also essential that all inspectors are aware of the regulations and review them regularly. Be sure to review the regulations found at this link:

https://www.agriculture.pa.gov/consumer_protection/amusement%20rides/Documents/AMUSEMENT%20RIDE%20REGULATIONS%20-%207%20Pa%20Code%20Ch%20139.pdf

New inspectors are required to attend an approved seminar at least once within each three-year certification period. Your required hours of training for Trackless Towed Attraction certification is 16 hours. The seminar alone does not prepare you for the test. If you need to become certified and have not yet attended the required seminar, we may extend a one-time grace period until the next seminar so that you can comply immediately pending review of qualifications.

An application to become a Pennsylvania Qualified Amusement Ride Inspector is at this link:

https://www.agriculture.pa.gov/consumer_protection/amusement%20rides/Documents/Inspector%20Application%202022.pdf

Please complete the application and return it to the Department as soon as possible for review in order to schedule a test at an approved seminar or at our Harrisburg location. The Amusement Ride Private Qualified Inspector test is administered by appointment throughout the year and during approved ride inspector safety seminars. If you wish to take the test, please contact Supervisor Joe Filoromo at 717-215-4316 or jfiloromo@pa.gov for any additional assistance.

The Department updates study material as necessary. The Department limits the number of times a person can attempt to pass the test to three (3).

The Department assesses a \$50.00 certification fee, payable the day of the test. Make checks payable to "Commonwealth of Pa". The Department does not accept cash.

Questions should be submitted to jfiloromo@pa.gov or by calling 717-215-4316.

Thank You,

Joseph G. Filoromo, Supervisor

Trackless Towed Attractions

Overview

The trackless towed attractions provide fun and entertainment at all types of events. The events may consist of festivals, fairs, agritainment, haunted attractions, pumpkin patches, tree farms and many other locations. These attractions are popular as they provide a more family-oriented experience.

The attractions can accommodate many patrons to ride at once. The relative speed of the attraction is not fast or extreme, so they are suitable for patrons of all ages normally. There still may be some height, weight, age or number of patron requirements that need to be followed.

The common attraction type may fit into several type of categories. One would be a Hayride attraction. Another may be a Barrel Train attraction. Each of these may appear to be similar but have different requirements that may need to be looked at or directions to follow.

Hayrides are typically found on farms and at Fall events. Many haunted attraction locations use Hayrides as part of their haunt. Christmas tree farms and pumpkin patches use Hayrides to get people from the parking area to where the items being picked are. This adds to the excitement and amusement for the whole family or group.

A false sense of security goes along with these attractions. Guests put their guard down as they don't associate Hayrides with being an amusement attraction as they would rides at an amusement park. They may not view the tractor driver the same as they would view a ride operator at the amusement park. Although both, the driver and ride operator, are providing the same function. The driver has the same responsibility in adhering to the operational procedures they were given to provide a safe attraction or entertainment to the guest.

An operator of a Hayride always needs to be alert. There are times the operator may just have a few guests on the wagon. Other times, there may be as many as 30 or more depending on the size of the wagon. One of the biggest things to look for is the grade of the path or course being used. Too steep of grade could cause the wagon to tip over. It may even cause the trailer to jack knife into the tow vehicle or push the tow vehicle into a tree or over a bank. These situations may cause multiple serious injuries if they were to occur. It is extremely important to be a flat or close to 0 percent grade as much as possible. The speed of the attraction shall be appropriate for the course and the tow vehicle/wagon combo. There should be a way to determine the correct speed. This could be a speedometer or even a designated gear. Some tow vehicles may be equipped with a GPS device.

The operator must also be alert for guests to stay seated all the time. Guests being allowed to move around or stand up could possibly fall off the wagon. They could also fall onto another guest.

Tow vehicles are often tractors but may also be a truck or other vehicle with a hitch on it. The tow vehicle must have the weight, capacity, and traction to be able to control a fully loaded wagon or trailer. The tow vehicle or wagon must also have a fire extinguisher and some type of communication system. The extinguisher should be placed where it is easily accessible.

The construction of the Wagons is equally important. The size of the wagon or trailer should not be too large for the tow vehicle to control on the terrain and course being travelled. One thing to keep in mind is the number of guests on the wagon. The stopping power of the tow vehicle needs to be adequate for the wagon as well. Adding more guests adds more weight. There needs to be a maximum number of guests per wagon.

A patron barrier or bulkhead needs to be installed on the wagon on the side towards the tow vehicle. This is to prevent a guest accidentally falling between and getting seriously injured. The recommended height for this barrier should not be less than 18 inches. The connection point of the wagon to the tow vehicle needs to have some type of tamper proof locking device. A pin just dropped in is not adequate. Must have at least an "R" key or other means to keep the pin from bouncing out accidentally. It is important to use safety chains or cable between the tow vehicle and wagon and they must not be able to come accidentally disconnected.

Wagons should be numbered, lettered, or marked in a fashion so they can be easily identified for reference. This is very useful for loading and unloading. It's also useful to note wagons that may need maintenance. Some wagons may incorporate steps for the guests to enter easily. When using steps mounted to the trailer, a gate is recommended to stop guests from exiting before the wagon comes to a complete stop. Areas where loading and unloading occur should be properly lit to allow the guests to see where they are stepping.

Inspection of the tow vehicles is not to be ignored. Registered automotive vehicles in Pennsylvania are required to have an annual inspection. Tractors that get used for Hayrides are not normally inspected the same as cars and trucks. All tow vehicles, whether it is a truck or a tractor, should be thoroughly inspected prior to seasonal operation. The tow vehicles must also be inspected daily during the days when being used for the Hayride operation. A daily checklist is to be done and kept for records. Often many people state they are inspecting things, but if it's not documented, it was never done.

Wagons and trailers are to be inspected, of importance are the brakes on the wagon and trailers. The brakes on the wagons must working if installed and if the wagon/trailer were designed to have them. Taking the brakes off a wagon/trailer that came with them is strictly forbidden.

The trail and course being used for the attraction must be inspected each day as well. It may seem common sense to look for ruts and washouts. Another common item to look for are loose tree limbs from the night before. These could fall onto the wagon and/or guests. Erosion, trip hazards, sink holes, and fallen branches can happen after any storm.

Signage is another important item not to be forgotten. Guests may need direction on the proper place to be seated or there may be a certain height requirement to ride the attraction. Trip hazards can be indicated by highlighting them to be easily seen. Steps are a good example for a trip hazard. The edge being painted yellow is a good visual as descending from the wagon. Signage can be used as a direction of flow to the guests to follow. Using arrows can direct guests to always go in one direction to disperse weight evenly or even exit in a certain direction to minimize crowding.

The items mentioned are for guidance in having a safe attraction for guests of all ages. There may be other items not mentioned which are required or good to implement. Always complete the daily inspection prior to operating any attraction. It's a good practice to change routine in how and who does the daily inspections. Day one may be walking in the normal path of travel and Day 2 in the opposite path of travel. Or one operator inspects one direction as another goes in the other direction. What works for one location does not work all location. Use all senses and listen to the input from the operators. They are the ones directly involved with the equipment every day.

Common Study Material

It is the intent of this study material to help the reader become a more valuable member of the amusement industry. It is anticipated that the reader intends to become a Certified Amusement Ride Inspector empowered to operate within the Commonwealth of Pennsylvania. Therefore, it is important for the reader to understand that the ability to become a Certified Ride Inspector rests on a combination of experience, mechanical aptitude, and testing ability. Because of the requirement for experience, not all the questions asked in the test are found in this study material.

RESPONSIBILITY OF THE CERTIFIED RIDE INSPECTOR

It is **critical** to remember that the inspector who signs the inspection affidavit is the person **responsible** for the information found on that report.

Each inspector is responsible to provide a signed inspection affidavit for the inspection of **all** the rides he/she inspects.

Inspections conducted by a **team** of inspectors require that each team member submit an inspection affidavit for rides he/she inspected.

Multiple signers of an inspection affidavit will **void** the document; and require an appropriate inspection by an explanation to the Department of Agriculture.

HISTORY OF THE ACT

In 1984 the Pennsylvania Legislature enacted, and Governor Thornburg signed into law legislation "providing for the inspection of amusement rides and attractions; granting powers and imposing duties on the Department of Agriculture; creating the Amusement Ride Safety Advisory Board; and imposing civil and criminal penalties". This (Act 1984-81) is known as "The Amusement Ride Inspection Act".

This Act empowers the Department of Agriculture to develop and enforce regulations found in 7 Pa. Code, Chapter 139. It is the Act and the accompanying regulations that will dictate the actions of Certified Amusement Ride Inspectors.

GUIDELINES FOR RIDE INSPECITON LOCATION AND INSTALLATION

Free from Adjacent Hazards and Interferences

All rides, walk through shows, and funhouses, should be located in such a manner that they do not physically interfere with other rides. Severe and even fatal accidents have occurred as a result of improperly placed rides.

Operating clearances should be carefully verified for each ride prior to passenger loading. Nearby utility poles, trees, buildings, and other structures may present interference to safe ride operation and their clearances should be verified. There shall be a six-foot clearance between rides. Particular attention should be paid to overhanging items such as lighting, power lines, telephone cables, overhead piping, guy wires, and anything which is apt to be a hazard to the safe operation of the ride. It should be noted that power lines may increase their sag under conditions of hot weather and heavy current draw (after the initial inspection). Be sure to take this possibility into account when inspections are made.

Rides and fencing should be so located that it is impossible for a person to reach over the fence and grab the hand of a passenger reaching out of a carrier.

In Level Position on Solid Ground or Pavement

Portable rides are intended for installation on solid ground or pavement. They are designed in such a manner that no special foundations are required. Many of them are trailer mounted and have outrigger supports to provide stability and to resist wind forces. Some have hydraulic or mechanical jacks to assist in installation and leveling. Some will require blocking to produce a satisfactory installation.

Assuming that the soil or pavement is adequate to provide ride support, it is desirable that the ride be approximately level after all adjustments are made. This can usually be done by sighting the ride from several directions.

A small hand level can be used to arrive at a more accurate determination. In general, the taller the ride the more need for accurate leveling.

Properly Blocked and Jacked

Every ride installation should be examined to determine that the blocking or jacks, which have been used, are doing their job and not presenting a hazard in themselves. Narrow blocking should be avoided since the blocking should spread the load over a larger area and not concentrate it. Excessively high blocking contributes to instability. Poorly placed blocking can contribute to instability and should not be permitted. Blocking should be placed at the points which the manufacturer has indicated as being proper. In the absence of specific information, the blocking should be placed under the obvious strong points of the main frame or outriggers of the ride. Blocking generally should not be placed at locations where the structure may be observed to move or bend on the blocking as the ride operates. The structure and blocking should be checked to assure that the structure is resting firmly on the blocking and that a suitable number of blocks have been used to properly support the ride structure.

If the ride is equipped with mechanical or hydraulic jacks, the inspection is simplified. The jacks should be examined to make sure that they are in good mechanical condition and being used properly. Check for missing parts such as the base plate on the end of the Jack screw or cylinder. If the original plate is missing and another plate or wood block has been substituted, make sure it is of adequate size to properly spread the load (as the original one did). It should be noted that hydraulic pressure can increase in the jack due to expansion when the jack is exposed to heat and direct sun rays. This increased pressure can cause the leveling jack to raise the ride off the locking rings or support and create an unstable condition. This condition can be avoided if the needle valves and hand pump valve are opened to relieve pressure on the leveling jacks after the ride is leveled and otherwise supported. Whether the ride has been blocked, jacked, or a combination of the two achieve level conditions, the important thing is to be sure that the ride is not only level, but also supported securely on the blocks or jacks.

In all cases, the ride structure, and the blocks or jacks, should finally be examined when the ride is running. This is in order to be sure the support is proper, and nothing has been overlooked. On some rides, the rides frame tends to move relative to the blocking during the ride operation. For this reason, the ride should be examined periodically during its operation to assure it does not move off the blocking. Blocking shall have the same width, length, and height. (e.g. Four-Foot-high requires 4' X 4' base)

Properly Anchored, Braced and Guyed

If a ride requires anchors, braces, or guy lines to produce a satisfactory installation, they should be properly installed before the ride is permitted to operate. Items such as the inflatable plastic pillows, (i.e., Moonwalk, etc.), need to be anchored securely in position as they tend to move around rather easily in operation. Stakes are commonly used in conjunction with lines from the pillow in a manner like staking a tent. In this situation, the installation should be examined to make sure that enough stakes have been properly installed to secure the item in position. The stakes, particularly near the entrance, should not be installed in such a manner as to present a stumbling or tripping hazard. On hard pavements where it is difficult to drive stakes, concrete anchors (like boat anchors) or sandbags are sometimes used. These can be effective and should be permitted if they are of adequate weight and appear to satisfactorily restrain the pillow.

Bracing of a demountable nature is often used both on the ride structure and to support scenery panels. This bracing should be checked to verify it is present, installed at the proper locations, and adequately secured. A thorough visual examination of the ride will usually enable one to spot missing braces. Clues to look to for are holes not filled with bolts or pins. These may be intended as attachment points for braces. **If you are in doubt, refer to the manufacturer's manual for definite information.**

Some rides, particularly high structures, use guy wires or cables to prevent collapse from wind loads or to tie various parts of the ride structure together more or less rigidly. Guy wires and wind braces, where necessary, should be properly placed, properly adjusted, and in good condition in order to accomplish their job. Connection points of all guy wires should be examined to be sure they are of good quality. If the connection is made to a stake in the ground, be sure that the stake is suitable anchored in the ground (or pavement) so it does not yield and allow the guy wire to develop excessive slack. Guy wires, many times, occur in pairs and when properly adjusted, will have nearly equal tension in both wires of the pair. If the wires are not properly adjusted, excessive movement of the ride may occur. The manufacturer's manual is a good reference to determine the number, placement and adjustment of the guy wires or cables.

Leveling and Blocking

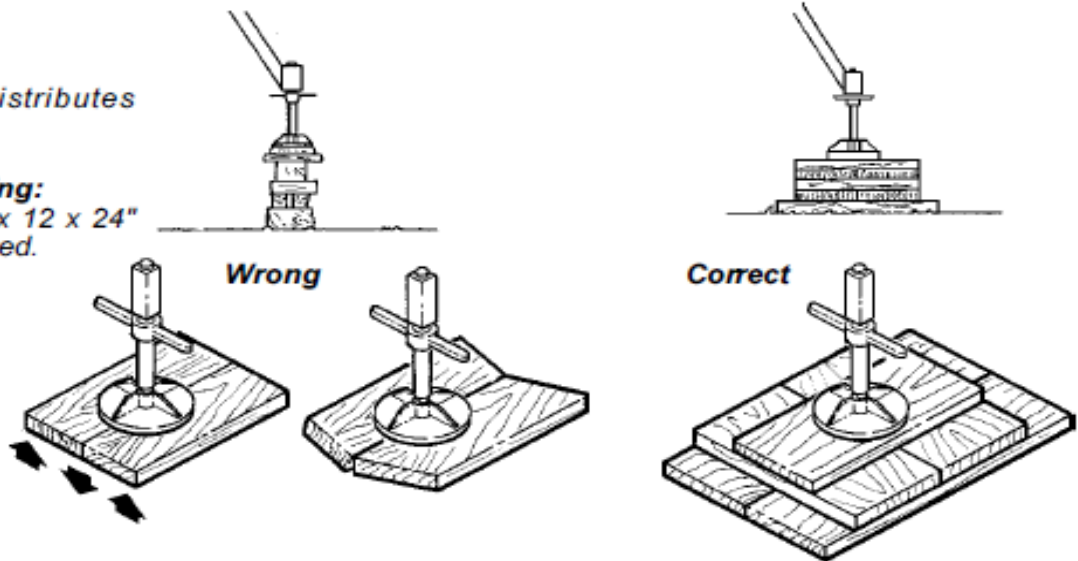
1. Inspect leveling and blocking at each set up and at the start of each day (rides erected in soft locations require more frequent inspection).
2. Inspect for proper cross blocking or crib blocking. Cross blocking distributes weight evenly.

Always Cross Block

Cross blocking distributes weight evenly.

Recommended Blocking:

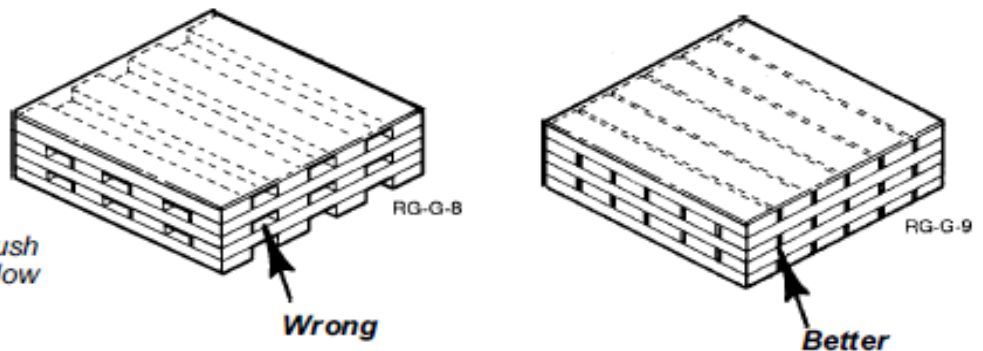
3 x 12 x 36" and 3 x 12 x 24" unless otherwise noted.



To avoid crushing under load "crib" blocking should be spaced no more than 1/4" for drainage.

"Crib" Blocking

Large voids can let blocking crush under load. 1/4" spaces allow adequate drainage.



3. Inspect blocking for proper contact with ground.
4. Level ground under blocking by digging where possible, instead of filling. Fill dirt will be soft and allow settling.



Blocking on a Slope

Level the ground beneath blocking by digging where possible. Don't fill, the fill dirt will be soft allowing the ride to tilt

5. Inspect hydraulic leveling jacks for leaks at every set-up. The hydraulic jacks are for leveling purposes only. They must be retracted and their shut-off valves closed during normal ride operation. Likewise, they must be fully retracted and their shut-off valves closed before transporting the ride.⁸ Check for installation of safety decals at each jack and near the shut-off valves.

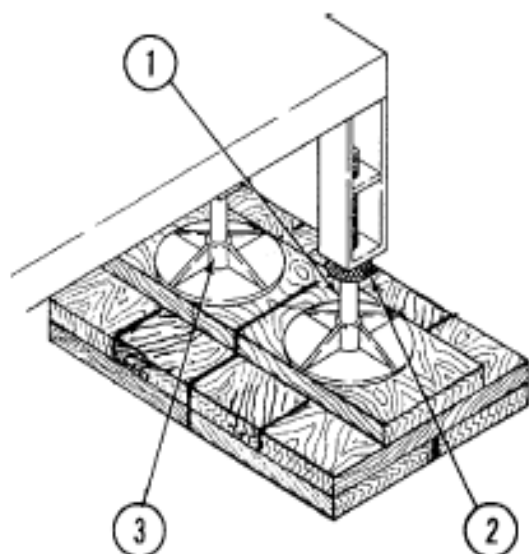


WARNING

RETRACT THE HYDRAULIC LEVELING JACKS AND CLOSE THE SHUT-OFF VALVES FOR THE JACKS DURING NORMAL RIDE OPERATION.

If the valves are left open, hydraulic pressure from the drive system, or pressure from hydraulic oil expanding due to heat can cause one or more of the jacks to extend, making the ride unstable. Injuries to passengers and/or bystanders can result.

6. Check the lock rings on all screw jacks for tightness.



1. Screw Jack
2. Lock Ring
3. Hydraulic Leveling Jack

Stairs and Walkways in safe and Secure Condition

Walkways should be solid and free of projections which might cause stumbling. Extremely smooth metal or wood surfaces can result from normal traffic wear. These can be conducive to falls and can be quite dangerous, particularly when wet. When these conditions are encountered, corrections should be made before operation is permitted. Handrails should be present on stairs and ramps. Walkways may or may not need handrails depending on the physical layout. The judgement and discretion of the inspector will be required in some cases to assess the degree of hazard involved and the correction to be made. Bear in mind that public safety is paramount. On rides where the public enters or exits above grade, the stairs, ramps, and walkways should be checked to be sure they are in good condition.

Proper Fencing and Railings

All rides must be adequately fenced to provide protection to spectators and riders. Fences should be located to provide a safe distance from the outmost point of swings or aerial rides. Breaks in fencing be limited to those necessary to allow proper entrance and exit by passengers. Slides, or their walkways, should be protected by guards to restrain the person sliding from falling over the side. Power units should be shielded from the public. In some cases, this will require fencing. Depending upon the construction of the power unit, however, some units can be shielded by barricades or screen panels at the openings of the trailer containing the power unit. **The inspector should use his judgement to determine that a proper result is being obtained.**

Fire Extinguishers- Number, Size & Locations

The Inspector should verify that a properly charged fire extinguisher is present on every site and that the operator knows its location. All extinguishers should meet the standards of state and local fire officials.

Free of Unguarded Pinch Points

Rides and shows should be carefully examined for areas where a person might be struck by, caught in, caught between, or otherwise exposed to moving parts or hazards. Be alert to the possibility that children and even adults sometimes do unexpected things and thereby risk their own safety.

STRUCTURAL INTEGRITY

Assembled in Correct Manner

A ride, when completely assembled, should be examined to determine if it has been put together properly. Previous experience and the manufacturer's manual will be of value in making this determination. Gross mis-assembled will be rather obvious by comparing the assembled ride with photos or drawings in the manual. Some mis-assembly will be less obvious, such as a member being bolted to the wrong place or attached to the wrong side of another member. Sometimes this can be determined by an examination of photos or sketches and sometimes it "**Just doesn't look right**". Any sign or clue of improper assembly should be reason not to allow the ride to operate until the correctness of the assembly has been determined. In case of doubt, contact the inspection office. The essence of correct assembly is the use of proper components in the right places. Be alert to areas which have been modified from the manufactured configuration. Mechanical items

which you know or suspect to be different from the original item should be checked to determine if they appear adequate for the job. They should also be looked at from the standpoint of their effect upon the characteristic of the ride such as speed, control, braking, etc. If the substituted item has deteriorated the quality and safety of the ride, then its use should not be permitted.

Free of Cracks and Excessive Wear

Most manufacturer's service manuals and bulletins will indicate the areas where heavy stresses occur and where cracks are prone to develop. The bulletins usually pinpoint specific areas where problems have been found and indicate the corrective action necessary. In some cases, modification kits are required to correct the problem. In other cases, instructions are given for making repairs on the existing members. It should be remembered information is not exhaustive and cracks or other problems may develop in areas for which there is no information available. If the repair is to be made by welding, it should be done by a welder skilled in this type of repair. If cracks are welded cracks structural members which show evidence of abuse, extensive welding, or widespread cracking should be recommended for further repair. Poor quality welds can many times be detected by their appearance. In case of doubt, do not permit a ride with evidence of poor welding to operate until satisfactory correction has been made. In some cases, the manufacturer will indicate that a member is not to be repaired by welding. Any cases of this nature should be cause not to allow the ride to operate no matter how good the weld may appear to be. **Insist that the repair be made in accordance with the manufacturer's specifications.**

Cracked paint may or may not indicate a cracked area. It is a good clue, however, and all such locations should be examined carefully. The areas around bolt and pin holes should be examined for cracks. Pins and bolts in critical areas should also be checked for evidence of cracks, particularly in the threaded portions, around cotter or pin holes and under the head. In case of doubt, have the bolt or pin replaced before operation.

During the examinations of the structure for cracks, the inspector should look for loosened bolts or rivets and badly worn or elongated holes. Pinned connections or other joints that have developed excessive wear should be recommended for repairs in accordance with manufacturer's specifications.

Properly Pinned with Correct Grade of Bolts

Ride manufacturers use bolts throughout their products. Many in locations where failure could be catastrophic with injury or death resulting. Inspectors and others, concerned with ride safety, need to familiarize themselves with the various types and grades of bolts used by the ride industry. Identification of bolts that are in place on a structure should be of concern to inspectors and ride maintenance personnel. Rides built by European manufacturers will contain graded metric bolts. The inspector should check for loose bolts and verify that common bolts have not been substituted for graded bolts. Particular attention should be given to the main ride structure, sweep connections, tub and car attachments, and nay connection where bolt failure could be catastrophic.

Properly Pinned Secured with Retainers

As an aid to rapid assembly and disassembly, many ride connections are made with pull pins rather than bolts. The type of pin used is designed to be used with a spring pin ("R" pin or other type) as a retainer to prevent the pull pin from working out as the ride operates. These pins have strength qualities like graded bolts. The inspector should make sure that any pins which have developed cracks should be replaced. Spring retaining pins, ("R" pins), which have spread to the point that they are no longer held securely in position, should also be replaced.

Properly Aligned Including Sheaves and Cables

A ride should be inspected for alignment of major parts such as uprights, wheels, bearings, heaves, guides, couplings, cables, gearing, shafting and other mechanical parts or assemblies. Most out of line conditions can be determined by visual inspection. In case of doubt, contact the inspection office.

Cables, Chains, Belts and Gearing in Safe Condition

All wire rope, whether used for support or drive cables or for any other purpose, must be thoroughly examined. Wire rope found to be damaged is to be repaired or replaced with new rope of proper design and capacity, in accordance with the ride manufacturer's specifications. Any of the following conditions is cause for rope replacement or repair:

- A. In running ropes, six randomly distributed wires in one rope lay, or three broken wires in one strand in one rope lay. A rope lay is the length along the rope in which one strand makes a complete revolution around the rope.
- B. In pendants or standing ropes (ropes bearing the entire load and subjected to constant pressure and surge shocks), evidence of more than one broken wire in one rope lay.
- C. Heat damage including welding, brazing and soldering to the rope itself.

Improper use of Clamps and Excessive Splicing

All mechanical devices that brake, control, or meet wire rope, such as rollers, drums and sheaves must be examined for broken chips, undue roughness, uneven or extreme wear.

Chains, belts, gearing and other drive components should be checked to make sure that they are in satisfactory operating condition and show evidence of proper lubrication.

Support chains such as those used to support chair seats on swings should be examined to make sure they are in good condition and are attached safely. Extreme wear, cracked or broken links or attachments, call for immediate replacement. It is recommended that chain be welded link and of proper capacity; and any components shall be of compatible material. Check with Manufacturer for proper type of chain.

Lock-Out / Tag-Out

Whenever it becomes necessary to work on belting or any piece of machinery, employees shall assure themselves that a proper tag is attached to the pump, governor, valve throttle, switch, or other device used to set the machine into motion.

The equipment shall be de-energized and locked out. Each employee should be assigned one 6 hole "scissors-type" lock-out assembly, two personal padlocks (for which only the employee will have keys) and two plastic "Danger-do Not Operate" tags to be used in conjunction with the padlocks and lock-out device.

These lock-out tools must be carried by the employee to the job site at all times and be properly installed before any work is performed on electrical or mechanical equipment whenever there is the possibility of electrical shock, or of the possibility of machinery being set in motion while work is being performed.

Each person working on the job must install a padlock and tag identified and employees name on the lock-out device before beginning to work and should remove the personalized lock and tag when leaving the job site.

If the machinery does not have a safety switch or does not have a switch that can be locked off, notify the electrical department prior to beginning work.

The electrical crew will remove fuses or disconnect wires in order to make the job safe to perform the work.

Red tagging where fuses are removed or wires disconnected must be done by the electrician and only the electrician can restore power by making the necessary connections.

Locking a push-button station stop button "off" shall not be considered as safety locked off, because a problem with the wiring or someone tampering with the motor starter could energize the equipment.

In a case where a circuit breaker is the only disconnecting means, in lieu of disconnecting wires, a "Do Not Operate" tag may be securely attached to the turned off breaker and a guard posted to assure that no one turns the circuit on.

No one may, at any time remove any other persons locking device, or start up any equipment while anyone else has it locked out.

Lock-Out Procedures

To assure the safety of maintenance working on or about any large piece of equipment such as an amusement ride/attraction or device, lock-out procedures should be developed and implemented. The following is an example of a typical maintenance lock-out procedure.

Lock-out procedure Ride/Attraction

The main key switch of the control power must be locked in the off position and the key removed to avoid any accidental start-up of the device while personnel are working on it.

A red tag must be affixed to the emergency stop button before any maintenance work can be carried out on the ride or attraction.

Maintenance

Employees working about moving machinery or live equipment and circuits shall proceed with great care when performing their work, considering carefully each act and doing nothing which may endanger themselves or others.

Employees shall be careful to place themselves in a safe and secure position and to avoid slipping, stumbling or moving backward into moving machinery or live parts, or into openings.

Note

It is recommended that all power and operating machinery be locked off prior to any work being started, however where live electrical circuits and operating machinery is necessary to perform required work, a minimum of two (2) qualified persons should be required in these locations maintaining radio, or telephone communications to the ride/attraction control operator.

Identification of Fastener Grades

Virtually every mechanical assembly used by industry, transportation and construction is literally held together with fasteners.

Few of us realize how important the quality of these fasteners is in assuring that the equipment we depend on daily is safe and reliable.

Before a mechanic can select the correct grade of fastener for the application and determine the proper installation torque, he must know the strength of each grade and be able to tell one from the other. This becomes vitally important when a mechanic removes an OEM specified bolt from a connection to perform regular maintenance. The mechanic must identify the grade of fastener removed and replace that bolt with the SAME grade.

Failure to do so could result in an accident because of a lesser grade bolt used in the connection. This may cause expensive property damage and/or sever personal injury. Extensive liability suits could result.

Four nationally recognized technical groups of engineers define fastener standards and specifications. These organizations are the Society of Automotive Engineers (SAE), the American Society for Testing and Materials (ASTM), the International Standards Organization (ISO), and the Industrial Fastener Institute (IFI). They have established a method of identifying various grades of fasteners. They also established the minimum strength requirements, chemical analysis of steel to be used and, where called for, the degree of heat treatment that is permissible for each grade. The following chart shows the head markings in use, and the material and mechanical requirements for each SAE grade.

Besides the standard grad markings on the heads of the fasteners, as indicated in the Head Marking Chart, most fasteners manufactured in North America have a manufacturer's identification logo placed somewhere on the product.

A listing of these logos is found in the IFI-122 publication issued by the Industrial Fasteners Institute, Cleveland, Ohio. The purpose is for identity and traceability. These fasteners **MUST** meet the indicated SAE specifications. If, for instance, there are just three radial lines on the head, indicating it to be Grade 5, with other markings, then the bolt is imported. This is very important because U.S. laws do not apply in foreign countries. We are not to say that imported fasteners without a manufacturer I.D. do not meet SAE specifications...they just don't **HAVE** to meet them; and there is no incoming inspection made of imported fasteners by the brokerage firms that import and distribute them.

The Bowman Distribution Engineering Department has tested imported bolts marked with Grad 8 radial lines that did not meet Grade 5 specifications; yet others out of the same box, identical in appearance, would meet the required specifications. The point is, with imported bolts, you must know **WHAT** you are buying.

Imported fasteners are purchased by brokers who buy from many different sources. In the case of a liability claim, if there isn't a manufacturers I.D., there is absolutely **NO WAY** to trace the manufacturer of the bolt.













The chart in this book lists the different SAE and Metric grades of fasteners.

With the trend of downsizing in the automotive industry and the increasing use of metrics, original equipment manufacturers could not rely upon the strength of the Property Class 8.8. Instead, they have automatically upgraded themselves with an increase in strength by specifying the 9.8 Property Class.

Although some Grade 6 fasteners (formally discontinued by SAE in 1964), or those marked with only four radial lines, may have tensile strengths which are close to or compared to those of the Grade 8, **NEVER** substitute a Grade 6 for the Grade 8. They will not meet the SAE Grade 8 steel chemistry requirements. Where an SAE Grade 8 cap screw is specified, or designated as OEM, **ALWAYS** make replacements with the **SAME** grade to prevent liability claims. Consult your service manuals or factory representative for verification.

Glossary of Terms

- ASTM - American Society for Testing Materials (Chemical & Physical Specifications)
- ANSI - American National Standards Institute (Dimensional Specifications)
- SAE - Society of Automotive Engineers Specification of Grade 5 and Grade 8 Hardware
- ASME - American Society of Mechanical Engineers
- ISO - International Organization for Standards
- FQA - Fastener Quality Act (Public Law 101-592) To be enacted May 27, 1998

Correct markings	Examples of unacceptable markings
<p>SAE J429 Grade 5 Medium carbon 81,000 yield</p> 	 <p>Grade 5.1 Low carbon</p>  <p>Grade 5.2 Low carbon martensitic</p>
<p>ASTM A325 Type 1 Medium carbon Longer shank and shorter thread length than Grade 5 81,000 yield</p>  <p>ASTM A325 Type 1 Medium carbon Longer shank and shorter thread length than Grade 5 81,000 yield</p> 	 <p>ASTM A325 Type 2 Low carbon martensitic</p>
<p>SAE J429 Grade 8 Medium carbon 130,000 yield</p> 	 <p>ISO R898 Class 8.8 Medium carbon 92,000 yield</p> 
<p>ASTM A490 Alloy steel Longer shank and shorter thread length than Grade 8 130,000 yield</p> 	 <p>ISO R898 Class 10.9 Alloy steel 130,000 yield</p> 

Grade Markings for Functional Load Carrying Capscrews

SIZE (DIAMETER) - Threads per Inch	Torque Range in foot -pounds (see notes 1, 2 and 4) with locknut and hardened washer	
	SAE J429 Grade 5 ASTM A325	SAE J429 Grade 8 ASTM A490
1/4 - 20 1/4 -28	5-6 6-7	7-8 8-10
5/16 - 18 5/16 - 24	11-13 12-15	15-18 17-21
3/8 - 16 3/8 - 24	19-24 22-27	27-33 31-38
7/16 - 14 7/16 - 20	30-35 35-40	45-55 50-60
1/2 - 13 1/2 - 20	50-60 55-65	65-80 75-90
5/8 - 11 5/8 - 18	95-115 105-130	130-160 150-180
3/4 - 10 3/4 - 16	165-200 185-225	235-285 260-320
7/8 - 9 7/8 - 14	270-325 295-360	380-460 415-505
1 - 8 1 - 14	400-490 440-535	565-690 620-755
1 1/8 - 7 1 1/8 - 12	495-600 555-675	800-975 900-1095
1 1/4 - 7 1 1/4 - 12	700-850 775-940	1135-1380 1255-1525
1 1/2 - 6 1 1/2 - 12	1215-1480 1370-1660	1975-2390 2220-2700
NOTES: 1. Use anti-seize lubricant on capscrew shank when tightened from head end. 2. Use 10% less torque when anti-seize or other lubricant is used on threads. 3. Use same torque range for holes tapped in steel. 4. Use these torque values unless otherwise specified.		

Torque Chart

Torques for functional load carrying cold finished hex head capscrews with dry rolled threads, used with locknuts (see note 3), and tightened with an ASTM A325 hardened washer under the capscrew or locknut head (whichever is accessible for tightening).

This torque range will develop 60% to 70% of proof load.

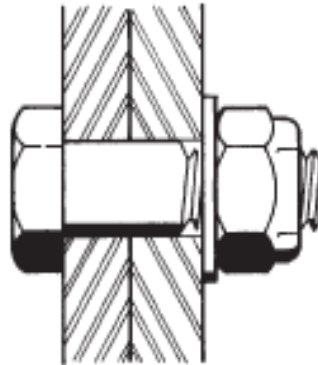
*Refer to **Replacement of Capscrews and Locknuts** for conditions requiring replacement*

NEVER REPLACE CAPSCREWS OR NUTS WITH PARTS OF A LESSER GRADE, OR DIFFERENT LENGTHS THAN THOSE SHOWN IN THE CHANCE PARTS CATALOG.

ASTM A325



ASTM A490



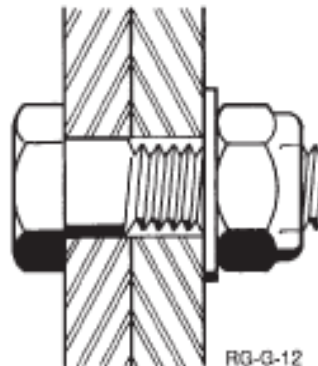
Capscrew Comparison

ASTM A325 and A490 cap screws have longer shanks and shorter threads than Grade 5 and Grade 8 cap screws of the same size.

Grade 5



Grade 8



RG-G-12

Replacement of Capscrews and Locknuts

When permanently installed capscrews and locknuts are disassembled for repair or adjustment, they must be replaced if they have been in service over five (5) years, or corrosion, or other damage requires over-torquing for removal. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

Capscrews and locknuts which are frequently disassembled for portability must be replaced each operating season. If the capscrews and locknuts become damaged, corroded or require excessive torque for removal, they must be replaced. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

Inspection

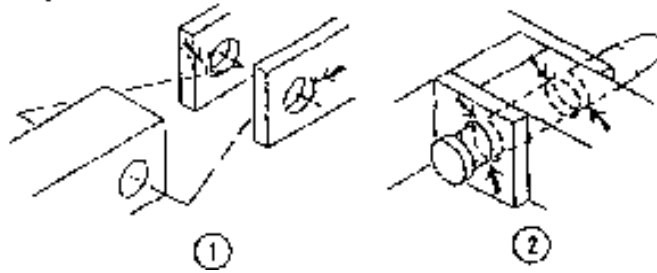
Joint Inspection

Some joints will appear to wear rapidly on new rides. This is usually a result of the holes not aligning in the mating parts. When this condition occurs, it results in “point contact”. A joint with this condition will generally wear rapidly until the load is distributed evenly over the fastener and the parts.

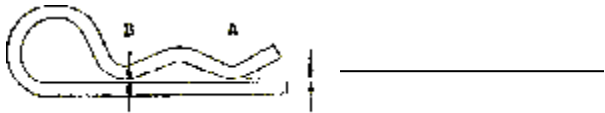
If in doubt about the condition of a bolt, pin or hole on a new ride consult the manufacturer and replace as required.

1. Inspect stationary joints for “egg-shaped” wear and loose pins

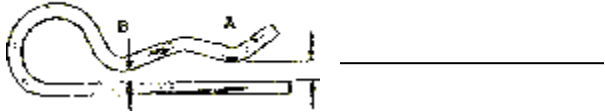
1. Stationary joint wear
2. Stationary joint-misaligned holes resulting in point contact



1. Severe corrosion
 - a. Rust appearing to stem from interior of cable.
 - b. Cable appears clean but previous corrosion is evident from pitted condition in wires.
2. Inspect moving joints for wear and lubrication.
3. Inspect welded structural joints for cracking or fatiguing.
4. Inspect bolted structural joints for cracking, fatiguing and proper bolt tightness.
5. Inspect pins and keepers on all pin joints for wear and proper installation.
6. Inspect all pins for proper manufacturer identification marks.



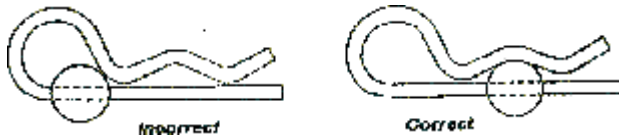
Acceptable hair pins
 Dimension "A" equal's
 dimension "B" in a relaxed
 position



Unacceptable hair pins
 Dimension "A" is greater than
 dimension "B" in a relaxed
 position

**NEVER ATTEMPT TO BEND A HAIR PIN BACK INTO SHAPE
 REPLACE IT WITH A NEW PART.**

The correct installation of a hairpin is shown. Incorrectly installed
 hairpins are more likely to fall and will distort after only a few users.



Recognize and recommend the safety procedures specified in ASTM
 Standards F770 Operation Procedures for Amusement Rides and
 Devices and F853 Maintenance Procedures for Amusement Rides
 and Devices.

Fire Safety

Fires have played a part in the amusement industry for many years. In the early 1900's fire destroyed many amusement piers and parks. In the mid- eighties, a devastating fire in New Jersey claimed the lives of 7 teenage park visitors while they were walking through a Haunted House type attraction made up of a series of trailers. Amusement ride regulations were implemented by a number of states, including Pennsylvania, following the fire in New Jersey.

Fire Safety and Fire Extinguishers play a part in the inspections, operations and maintenance of every fixed site and mobile amusement operation. Areas of concern in the amusement industry include such things as Walk through Attractions, Gas Powered Rides, Generators, Stock Trailers and Warehouses, electrical Equipment, Dark Rides, Flammable and Combustible Liquid Storage, as well many other attractions, amusement rides and devices too numerous to mention.

The National Fire Protection Association (NFPA) has classified four general types of fires, based on the combustible materials involved and the type of extinguisher needed to put them out. The four fire classifications are A,B,C and D. Each classification has a special symbol and color identification.

General Classes of Fires

Class A: This type of fire is the most common. The combustible materials are things such as wood, cloth, paper, rubber and plastics. The common extinguisher agent is water, but dry chemicals are also effective.

Class B: Flammable liquids, gases and greases create class B fires. Extinguishers to use are foam, carbon dioxide and dry chemical.

Class C: These fires are electrical fires and non-conducting agent must be used. Carbon dioxide and dry chemical extinguishers are to be used.

Class D: Combustible metals fires such as magnesium, titanium and sodium.

Class E: These fires require specialized techniques to extinguish them.

Types of Fire Extinguishers

Here is a list of fire extinguishers most commonly found in an amusement operation:

Water

Carbon Dioxide

Dry Chemical

Multipurpose Dry Chemical

Multipurpose fire extinguishers (ABC) will handle all A, B, and C fires. All fire extinguishers are labeled with either ABC, or A, or B or C, so be sure to read the labels.

How to Use a Fire Extinguisher

Even though extinguishers come in several shapes and sizes, they all operate in a similar manner. Here's an easy acronym for fire extinguisher use:

P A S S - Pull, Aim, Squeeze, Sweep

PULL the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.

AIM the nozzle toward the base of the fire.

SQUEEZE stand approximately 8 feet away from the fire and squeeze the handle to discharge the extinguisher. If you release the handle, the discharge will stop.

SWEEP the nozzle back and forth at the base of the fire. After the fire appears to be out, watch it carefully since it may re-ignite!

Suggested Areas to Check during Fire Safety Inspections

- Trash and litter, no unnecessary accumulation
- Housekeeping, rides and work areas neat and clean
- Fire extinguishers, well-marked, correct types, charged and ready to go
- Hazardous Materials, stored in designated areas
- Exits, well-marked and unobstructed
- Wiring, good connections, good grounds, insulation intact
- Smoking, only in designated areas, signs posted
- Flammable materials, being handle with care, sign posted where applicable

**Please note, this is not an all-inclusive list. Inspectors are encouraged to develop their own list of inspection points.

Minimum Documentation Required to be On Site

Failure to file all required documents on time and accurately may result in penalty actions including fines and shutdowns.

- Inspection Affidavit
- Certificate of Insurance
- Daily Inspection Checklist
- Operator Training Documentation
- Maintenance Logs
- Manufacturers Owner Manual
- Registration Plate with "Current year's sticker"
- ALWAYS BE SURE THAT THE E-MAIL ADDRESS THAT THE DEPARTMENT HAS ON FILE FOR OWNERS AND INSPECTORS IS ACCURATE.

Insurance Requirements

- The Insurance Provider, (Insurance Co.) must file a "Certificate of Insurance" in Harrisburg before the owner may open or operate Amusement Rides or Attractions to the public in Pennsylvania.
- Certificates received from the Owner are not acceptable.
- The Provider must list the following as Certificate Holder: Pennsylvania Department of Agriculture
- Amusement Ride Safety Division 2301 N. Cameron Street Harrisburg, PA 17110-9408
- It is the owner's responsibility to make sure that the provider sends the required information to the Bureau before opening.

Itinerary Requirements

- Itineraries are due at the time of registration or 15 Days prior to opening to the public and before completion of the Inspection Affidavit.
- Itineraries received less than 15 days in advance will be occasionally accepted as needed by E-Mail at jfiloromo@pa.gov or Faxed directly to Joe at 717-754-0228.
- Rental Companies must register an itinerary for every rental in advance of the event and before inspection.
- Inspections for Rentals at private homes only are due monthly within 30 days prior to the rental.

The easiest and preferred way for an owner to submit Itineraries is to input them online using your username and password. You may contact jfiloromo@pa.gov for a username and password if necessary.

Inspection Affidavit Requirements

All Inspection affidavits are good for up to 30 days or until the ride is moved, so Permanent location inspections are normally due monthly and Traveling Show inspections are normally due after each set-up.

- Inspection affidavits MUST be completed prior to opening rides to the public.
- Inspection Affidavits must be postmarked or sent (Online, E-mail or Fax) within 48 hours the inspection public).
- The Inspection Affidavit must list the name of the Owner Company as it is registered with the bureau.
- The Inspection Affidavit must be signed and dated by the inspector performing the inspection of not input online.

The easiest and preferred way for a Certified Inspector to submit Inspection Affidavits is to input them online using your username and password. Entering your Inspection Affidavit online is verifying that you performed the inspection as required by the regulations.

Certified Inspectors may contact jfiloromo@pa.gov for a username and password if necessary.

Easy Access to Important Documents

Important documents and forms can be viewed and downloaded from the Bureaus website. Other documents that can be found are the Regulation and Amusement Ride Inspection Act.

There is a link on the website called RideSafe. This link can be used by anyone to view inspections of rides and attractions.

There is also a link to login as an Owner or Inspector. An owner or inspector can login to view and enter different types of info. Contact Joe Filoromo if you need your username and password.

Some of the items that can be obtained from the webpage are:

- Amusement Ride Operator and Attendant Manual
- Amusement Ride Safety Flyer
- Inspector Study Material
- Registration Form
- Inspector Application
- Accident Report Form
- Inspection Affidavit Form
- Itinerary Form
- Amusement Ride Inspection Act
- Amusement Ride Regulations – 7 Pa Code Chapter 139
- Rider Responsibility Act

Below is the direct link to the Bureaus webpage:

[Pa Amusement Rides and Attractions](#)

Study Material links:

[Certified Inspector Study Material for Level 1 and Level 2](#)

[Extreme Sports Study Material](#)

[Go Kart Study Material](#)

[Inflatable Study Material](#)

[Water Attraction Study Material](#)

PRE-SEASON INSPECTION: WAGONS										
ITEM INSPECTED	Wagon #1	Wagon #2	Wagon #3	Wagon #4	Wagon #5	Wagon #6	Wagon #7	Wagon #8	Wagon #9	REPAIR NOTES:
TIRES: Are they in good condition? Is air pressure correct?										
WHEEL BOLTS: Are they tight and not broken?										
WAGON HUBS: Grease and lube.										
WELDS: Are there any cracks?										
WAGON FLOOR BOARDS: Are they secure? Are there any splinters? Are they in good condition?										
WAGON SIDES: Are they secure? Are they in good condition?										
RUNNING BOARDS: Are they secure? Are they in good condition?										
WAGON FRAME: Is it in good condition? Is there any rust? Is it bent? Is it cracked? Is it secure?										
AXLES/RUNNING GEAR: Are they in good condition?										
FIRE EXTINGUISHER: Is it charged and easily accessible?										
SPEAKERS: Are they secure?										

Daily Wagon Checklist

HAYRIDE SAFETY DAILY OPERATIONAL
CHECKLIST: WAGONS

Date: _____

✓ = Good NR = Needs Repair (see Notes)

DESCRIPTION	WAGON NUMBER									Notes
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
Steps secure										
Wagon sides secure										
Speakers secure										
Hitch pin secure										
Safety chains connected										
Fire extinguisher present and charged										
Lug bolts secure										
Bolt securing tongue to wagon secure										
Tires pressure good										
Splinter free										
Running boards secure										

Additional Notes:

Checked by: _____

Signature: _____

Daily Wagon Checklist

HAYRIDE SAFETY CHECKLIST: WAGONS

Date: _____

DESCRIPTION	WAGON NUMBER													
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
Steps secure														
Wagon bleachers secure														
Wagon walls secure														
Wagon back bracing secure														
Check safety chains on trailer														
Check fire extinguisher on trailer														
Check lug bolts on trailer														
Check trailer tongue to tractor														
Check tires on wagon														

Remarks:

Signature: _____

Daily Wagon Checklist
 HAYRIDE SAFETY DAILY
 OPERATIONAL CHECKLIST:
 WAGONS

Date: _____

✓ = Good NR = Needs Repair (see Notes)

DESCRIPTION	WAGON NUMBER									Notes
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
Steps secure										
Wagon sides secure										
Speakers secure										
Hitch pin secure										
Safety chains connected										
Fire extinguisher present and charged										
Lug bolts secure										
Bolt securing tongue to wagon secure										
Tires pressure good										
Splinter free										
Running boards secure										

Additional Notes:

Checked by: _____

Signature: _____

Daily Tow Vehicle Checklist

HAYRIDE SAFETY
CHECKLIST:
TRACTORS AND
COMBINED

Date: _____

DESCRIPTION	TRACTOR NUMBER													
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Combine
Tractor brakes operating														
Tractor headlights operating														
Check oil in tractor														
Check gas in tractor														
Check tires on tractor														
Check ball and nut on tractor														
Check lug bolts on tractor														

Remarks:

Signature: _____

Daily Tow Vehicle Checklist

HAYRIDE SAFETY DAILY OPERATIONAL
CHECKLIST: TRACTORS

Date: _____

✓ = Good NR = Needs Repair (see Notes)

DESCRIPTION	TRACTOR NUMBER									Notes
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
Tractor brakes operating										
Trans fluid level OK										
Oil level OK										
Fuel level OK										
Tire pressure OK										
Lug bolts secure										
Draw bar secure										

Additional Notes:

Checked by: _____

Signature: _____

Hayride Path Inspection

Date: _____

Manager: _____

Item Inspected	Good	Needs Repair	Notes
Check to make sure path is clear of any debris			
Check to make sure there are no low hanging branches			
Check to make sure hanging props are at proper height			
Check for any large potholes that could be hazardous			
Check to make sure all indoor building paths are clear			
Check to make sure all garage doors are operating properly			
Check to make sure no props have been moved or altered that may interfere with proper operation of the Hayride			

Additional Notes: