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WATER RIDE MAINTENANCE MANUAL

A) INSPECTIONS

1. PRE-OPENING INSPECTIONS:

Prior to operating each day, every individual flume should be inspected by qualified personnel. This inspection should be performed just prior to turning on the ride's water supply. The flume is to be checked for damage or any foreign matter that may be present within the flume trough. All surfaces with which a rider could make contact should be examined for chips, cracks or any other condition that could injure a rider. The joints of the flume should also be examined at this time, looking for caulk deterioration, excessive gapping, or alignment problems. Any problems found should be reported to the proper authority and the deficient flume not utilized until the problem(s) have been corrected.

Upon completion of the flume inspection, a visual inspection of the ride tower, its deck, walkways and handrails should be performed. Check for defective steps, deck surfaces and handrails. All surfaces with which a guest could make contact should be checked for splinters, chipped paint or any other condition which is potential hazard. Problem areas should be brought to the attention of the proper authority. The deficient facility should remain closed until the appropriate repairs have been completed.

The outer portion of the ride system must be inspected. Check the flanges and fasteners for signs of movement, compression or retraction. The section-to-section joints should be secure and all fasteners tight. Foundations should be checked for stability and integrity.

In some cases the performance of the inspection may require accessing areas that are elevated or extremely steep. Caution should be exercised when performing this portion of the inspection. Appropriate safety equipment must be used and proper procedures followed while accomplishing this inspection and any subsequent repairs.

Following the flume inspection, the pumps should be turned on and water allowed to flow down all rides which are going to be utilized. The correct flow rate and runout level should be achieved and maintained prior to allowing anyone to enter the start position of the ride.

It is recommended that the initial rider be a lifeguard or ride attendant. This will act as a final check that the ride is ready to be ridden by the general public. All communication, lifesaving and emergency equipment should be checked, to ensure it is present and in working order.

All lifeguards and ride attendants must be in position prior to allowing the general public to ride.

A) INSPECTIONS (Contd.)

2. DAILY INSPECTIONS DURING OPERATION:

Manufacturer's Recommended Inspection Points

Description	What to Check	Notes and Remarks
Foundations	Integrity--look for cracks, damaged or missing concrete, loose attachment bolts, missing fasteners. Check condition of base plates and grout.	Damaged foundations should be repaired, and verified by competent personnel for quality of materials and workmanship.
Supports, Uprights and Columns	Structural integrity--look for damaged or missing components. Check for loose or missing fasteners on all members. Look for signs of deterioration of all members and welds. Inspect for signs of corrosion to schedule and carry-out periodic anti-rust re-coating.	Problem areas should be checked by qualified individual to specify and implement corrective actions.
Yoke Plate and Attachment Points	Look for deteriorated, damaged or missing components. Check for loose or missing fasteners.	Repair or replace items as needed.
Ramps and Stairways	Look for deteriorated, damaged or loose components. Check condition and tightness of fasteners. Look for sharp or protruding objects. Check condition of handrails. Check to ensure sidewall protection is in place and no gaps exist.	

A) INSPECTIONS (Contd.)

2. DAILY INSPECTIONS DURING OPERATION (Contd.):

Manufacturer's Recommended Inspection Points (Contd.)

Description	What to Check	Notes and Remarks
Tower Platform	Check condition of walking surfaces, side protection, guard rails. Check to ensure start pool is secure to platform. Check for loose or missing fasteners on all members. Look for signs of deterioration of all members and welds. Inspect for signs of corrosion to schedule and carry-out periodic anti-rust re-coating.	Problem areas should be checked by qualified individual to specify and implement corrective actions.
Flume Trough	Inspect the flume's entire length--look for cracked, damaged, worn, or deteriorated riding surface. Check for chips, gouges or damage to the GEL COAT. Check alignment of joints. Look for loose or missing sealant. Check condition and tightness of all fasteners. Inspect outer circumference of ride for signs of deformation (i.e.: buckling or opening of joints. Section to section flange ends should be secure and all fasteners present and tight. Also check for any external damage to the flume system.	Repair or replace items as needed. Refer to attached FIBERGLASS repair procedures to repair FIBERGLASS damage.

A) **INSPECTIONS (Contd.)**

2. **DAILY INSPECTIONS DURING OPERATION (Contd.):**

Manufacturer's Recommended Inspection Points (Contd.)

Description	What to Check	Notes and Remarks
Splash Pool *	Check sides of pool for signs of deterioration or damage. Look for cracked or spalled concrete, leaks, bulges, or other signs of deformation. Look for presence of all gratings, light lenses, drain and return covers. Check to ensure they are properly installed and secure. Check to ensure all handrails are in place and secure.	Repair or replace items as needed.

3. INSPECTION CHECKLIST:

NOTE: ***Any and all attached equipment and/or structures completing the ride system must be maintained according to their manufacturers's recommendations. The entire ride system must be checked on a daily or scheduled basis according to those recommendations prior to use. The following is a generic checklist and does not supercede the specific recommendations of any manufacturer.***

	OK	NEEDS ATTENTION
Tower and Support Foundations		
Base Plates and Fasteners		
Supports, Upright and Columns		
Tower Connections, Gussets, Bracing and Cross Members		
Condition of Welds		
Support Arms		
Support Arm Attachment Points		
Yoke Plate		
Platform Checks		
Stairways and Ramps		
Handrails		
Non-Skid Surface		
Side Protection, Guardrails		
Flume Trough Checks		
Condition of Fiberglass		
Condition of Joints		
Start Pool Fastened to Platform		
Water Flow Rate Into Ride		
Condition of Piping, Joints, Unions *		
Piping Supports/Hangers *		
Leakage of Water Piping *		
Static Pool Water Level		
Operating Pool Water Level		

3. INSPECTION CHECKLIST (Cont'd):

	OK	NEEDS ATTENTION
Pool Grates and Drain Covers *		
End Flume Section Secure to Pool		
Pool Handrails and Exit Steps *		
Area Lighting *		
Underwater Lighting System *		
Conduit *		
PA System/Warning System *		
Pool Depth Markings		
Warning Signage		
General Signage		
Guard Station		

COMMENTS

_____

_____

_____

_____

_____

_____

Inspected By:_____ By:_____

* ***All items indicated are covered by other regulations or suppliers. These regulations or suppliers' recommendations should be followed and respected.***

B) MAINTENANCE DOCUMENTATION

It is recommended that all conditions requiring attention, whether discovered following an inspection, or at any time during operation, be repaired. At no time allow the ride to operate with any condition which poses a threat to the safety of guests or staff. In addition, it is recommended that all repairs of any kind performed on the ride be documented to provide a complete safety record for the equipment. A sample ride maintenance log form is included in this manual.

1. MAINTENANCE LOG:

ATTRACTION:_____

SERIAL NUMBER:_____

DATE:_____ REPAIRER:_____

DESCRIPTION OF
WORK:_____

_____

PARTS & MATERIALS
USED:_____

_____

DOWN TIME:_____ COST:_____

SUPERVISOR'S
SIGNATURE:_____

****

DATE:_____ REPAIRER:_____

DESCRIPTION OF
WORK:_____

_____

PARTS & MATERIALS
USED:_____

_____

DOWN TIME:_____ COST:_____

SUPERVISOR'S
SIGNATURE:_____

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C) FIBERGLASS GELCOAT SURFACE MAINTENANCE

This section is provided for the preparation of water ride flumes prior to their initial use. Following these recommended procedures are critical to ensuring retention of colour and gloss by limiting pigment loss caused by UV rays, chemicals and abrasions.

1. INITIAL SURFACE TREATMENT:

Working from the top down and prior to the ride catch pool being filled, ensure that the entire surface of the ride is cleaned to render it free from all contaminants. We recommend the following:

i) Wash fiberglass thoroughly with a non-abrasive cleaner, such as carwash soap; use non-abrasive cleaning tools; use warm water if possible; rinse thoroughly; let dry. Pressure washing is acceptable. Personnel performing this task should exercise caution and initiate all safety measures appropriate for the performance of such tasks.

ii) Upon completion of cleaning, the entire ride should be examined for stains or discoloration. Any stained or discolored areas should be restored using a concentrated cleaning solution or buffing compound. Once the surface has been certified clean, a coating of good quality automotive/marine wax (a list of quality products follows) is required. Care must be exercised to follow all manufacturer's instructions for application. The surface being waxed is in all probability outdoors and special attention should be given to the manufacturer's recommendations relative to climatic conditions.

After no less than 12 hours, a second coat of wax should be applied to the start pool and the first section of the ride downhill of the start section, along with the last 45 feet of the ride prior to the catch pool entry and/or all splash pool sections.

2) ONGOING SURFACE TREATMENT:

To maintain the appearance (color retention and gloss), it is essential to clean and wax the FIBERGLASS at least every month.

To achieve the best results, a carwash soap containing wax or PTFE (also known as Teflon®) should be used. The wax or PTFE help build a barrier against substances that would otherwise lodge in the porous GEL COAT. The soap additives will also help the wax on the riding surface.

After washing, a layer of wax must be applied. A paste wax with carnauba or PTFE will offer the best protection against fading, chalking, and other discolourations. These waxes are available at automotive supply stores.

It is recommended that the exterior surface is washed and waxed as often as the interior riding surface. The easiest method of doing this is with a pressure washer equipped with a detergent intake. Wash the surface with the same carwash soap as was used on the interior surface then rinse with fresh water. A coat of wax can be applied with the pressure washer using a liquid wax designed for this application. Such waxes can be found at automotive and recreational vehicle supply stores.

If an operator chooses not to perform this maintenance, the effects of dust, pollutants, water born chemicals (chlorine, calcium, etc.) will ultimately become part of the porous gelcoat surface. This creates the appearance that the colors are fading and will require more expensive maintenance (e.g.: compounding/sanding) to bring back the original color and gloss.

The wax treatment is extremely important to maximizing the retention of color and gloss for FIBERGLASS.

3) SURFACE TREATMENT METHODS:

Cleaner:

Any cleaner that is used should be in contact with the surface for a minimal amount of time. All cleaners are formulated to attack dirt to remove it. If left too long, the cleaner will begin to attack the surface it was meant to clean. It is best to use a carwash soap, which will work for a majority of stains and dirt accumulations.

Read the label and instructions. Pay particular attention to the precautions. ProSlide found one material recommended for FIBERGLASS that casually mentioned: "Keep off aluminium parts". The reason for this statement was the material contained HCL — more commonly known as hydrochloric acid.

Run a spot test. Try it in an inconspicuous area. If it discolours or dulls this area, do not use it.

Rubbing Compounds:

When a stain, chalk, or other discolouration cannot be remove with mild detergents or cleaners, it might be time to step up to rubbing compounds. These compounds come in a variety of grits from very coarse (high stock removal) to very fine (low stock removal). In most cases, fine to very fine grits are all that are needed.

Using clean pads, apply the compound liberally. Work a small area at a time (about 3 foot square). If using a buffer, keep the RPM's between 1700 and 3000. Keep only light pressure on the machine otherwise, it will cause scratching, pitting, gouging, and swirl marks. It is important not to let the pad dry out and to apply more compound as necessary. As a gloss appears, gradually lighten the pressure on the buffer. The part must be waxed after rubbing compound has been used.

Wet Sanding:

Sanding is another option available to bring the gloss back. It is recommended to start with 600 grit waterproof sandpaper. Wet the paper in a small bucket of water and rub the affected area. Be sure to keep the paper wet as this will keep the paper from clogging and from gouging the surface. Keep the strokes in the same direction, otherwise swirl marks will appear. Gradually work through 600, 800, and 1000 grits in ascending order. After sanding, apply a layer of wax to the part.

Waxes: As mentioned before, a wax with carnauba or PTFE is strongly recommended. Following the manufacturer's instructions, apply a thin coat of wax to a small area (about 3 foot square). Allow the wax to dry to a haze and remove with a clean terry cloth. Do not leave a large residue as excess wax can yellow, causing a streaking pattern later.

Stains: The easiest and safest practice of treating a stain is to start with the easiest and move up to more complicated as necessary. Start by washing with water and carwash soap. If this fails to remove the stain, try a cleaner. Always test the cleaner in an inconspicuous area beforehand. If the cleaner cannot remove the stain, rubbing with compounds or wet sanding may be needed. As always, apply wax to the area after any stain removal.

Scratches: These are best removed with a little rubbing compound following the practices outlined above. If the scratch is too deep, wet sand the area as described above.

4) WAXES AND COMPOUNDS FOR RIDE UPKEEP:

Waxes:
- Nu-Finish -white paste
- Turtle Wax -white paste

(Good U.V. Inhibitors)
- Eagle 1 Wet -white paste
- Rain Dance -white paste

Compounds:
- Au-G-Sol 200 (commercial grade compound)
- Dupont #7 white polishing compound.
- Most automotive medium grit compounds having a neutral color. A colored compound may stain the Gelcoat and become very difficult to remove.

D) GEL COAT REPAIR INSTRUCTIONS

1. TOOLS REQUIRED:

- Sharp knife (preferably one with break-away tips).
- Putty knife 1", 2", 3" (plastic preferred).
- Popsicle sticks (wood coffee sticks)(miniature putty knives).
- Cardboard (several stiff pieces 12" x 12").
- 2" masking tape.
- 1 bucket (2 - 3 gallons).
- 3 oz. M.E.K.P 50 clear liquid hardener
- 1 Can of automotive rubbing compound - medium (not supplied in kit).

2. GEL COAT REPAIR KIT (STANDARD):

QUANTITY	MATERIAL
1 Quart	- Gelcoat putty/paste in the appropriate color.
4 Sheets	- 220 grit dry sandpaper.
4 Sheets	- 400 grit wet sandpaper.
4 Sheets	- 600 grit wet sandpaper.
2 Sheets	- 1000 grit wet sandpaper.
1 Quart	- Polyester enamel in appropriate color, for exterior touch-ups.

3. PROCEDURE:

i) With knife, cut away all ragged edges and any loose fibre. Any caulk should be cut away. Don't be gentle. Any dirt, grease or caulk will not allow Gelcoat to adhere.

ii) On patches longer than 1", sand area with 100 grit sandpaper, DRY.

iii) Prepare at least 8 to 10 patches of 1" length or less, **or** 3 to 4 patches of a longer measure.

iv) Wash all areas with ACETONE and a CLEAN RAG.

v) Mask off areas where you do not want the Gelcoat to adhere.

vi) The Gelcoat paste supplies should be the appropriate amount for all repairs. However, you may thicken it with Cabosil or Aerosil if required. This should only be done by an expert. Too much will cause the paste to dry out and be unworkable.

vii) Using your own judgement, remove a sufficient amount of paste from quart can to fill all patches. Place paste on a piece of clean cardboard. This will be your work table.

viii) Close can of paste, as water will ruin Gelcoat and sun will dry it out. Never leave a can open longer than needed and try to keep it in the shade if possible.

ix) Spread paste on cardboard until it is approximately ¼" thick.

D) GEL COAT REPAIR INSTRUCTIONS (Contd.)

3. PROCEDURE (Contd.):

x) The catalyst required is Methyl Ethyl Ketone Peroxide 50% or M.E.K.P 50. Use clear version only. The red will alter the colour of the GEL COAT. The hardener (catalyst) can be found in tubes in some hardware stores as "Liquid Hardener". You will see the full name in the line print on the tube.

xi) Mixing is 2% by volume. If you have done step 9, imagine areas the size of golf balls in diameter. For each area of the diameter of a golf ball, you require 4 drops of catalyst. You will have to alter this amount based on temperature and humidity. If reaction is fast, reduce amount of catalyst. If too slow, increase SLOWLY.

xii) Form a small well in the GEL COAT paste and add amount of catalyst required. Carefully mix in GEL COAT until you are sure that the hardener has been mixed thoroughly, as it will not harden otherwise.

xiii) Apply mixed paste to all patches. Do not overfill. When hard, GEL COAT will require a lot of sanding if too much is applied. It is always best to be a little on the lean side.

xiv) If patching near a joint, be sure that the joint is restored after patching. Do not leave a patch fusing two sections of ride. Simply cut the joint with the edge of putty knife before proceeding to the next patch. Later, caulk can be installed when finished.

xv) If additional GEL COAT is required, NEVER use your putty knife with catalyst mix. Even if only a fraction of a drop were to get into main container, it would harden **ALL** in 2 days. Use a clean putty knife or thoroughly clean the knife with acetone and a rag.

xvi) Curing should occur in 30 to 45 minutes. If you do small batches, they will dry progressively and by the time you've patched a complete flume or two, the first areas should be ready for finishing.

xvii) GEL COAT is cured when surface is hard, not rubbery. It will remain tacky. When hard, wash areas with acetone to remove tackiness. This will save a lot of sandpaper.

xviii) With a bucket of water and 220 grit waterproof sandpaper, sand down the patch to very close to perfect level. Use plenty of water while sanding. This will remove the GEL COAT dust and keep paper from clogging.

xix) Progressively sand with finer and finer paper to get all the scratches produced by the proceeding grit paper. Do not over sand. If a colour change occurs, stop immediately, you are about to sand off the GEL COAT.

xx) If you get through the GEL COAT, then the only solution is to roughen area with 220 grit paper. Dry with acetone and apply a thin layer of GEL COAT.

xxi) After washing with water and either air drying or drying with rag, polish patch area with a medium grade or medium-coarse grade automotive rubbing compound.

xxii) As rubbing compound seems to appear as a wax, it must be remembered that is not! All areas should be waxed to prevent premature chalking.

E) REPAIRING A LEAKING SLIDE

There are several reasons why water slides leak. The number one reason is due to expansion and contraction of the fiberglass sections. This occurs when there are variances in the temperature. Fiberglass will expand in heat and shrink in cold. This is why the slide sections are put together using a sealant. This sealant is flexible to compensate for the expansion and contraction of the slide sections. Over time, these actions will cause voids in between the joints of the slide. This is where leaks may occur in the water slide. There are two types of leaks — an intermittent drip, or a constant leak.

1) Repairing an Intermittent Drip

Tools/Materials

1. Sharp razor blade knife
2. Acetone
3. Clean terry cloth towel
4. Sealant (Sika Flex 1A)
5. Flexible putty knife

Repair Method

I. From inside the riding surface of the slide, take the razor knife and cut into the leaking joint. Remove the old sealant that has lost its elasticity.

II. Take a clean rag or cloth with acetone and apply to the joint. This will clear all remaining dirt, debris, and water from the old sealant.

III. Apply new sealant in the area where sealant has been removed. Using the putty knife, work the sealant into the joint to ensure that the sealant has fully covered the void.

IV. Remove excess sealant with the putty knife, and wipe the joint clean with a clean cloth and acetone. Use the acetone sparingly as using too much can deteriorate the remaining sealant.

V. Allow up to twenty four hours for the sealant to properly cure. If this is not possible, allow as much time as possible.

2) Repairing a Constant Leak

Tools/Materials

1. Wood shims
2. 9/16" wrench
3. Ratchet with 9/16" socket
4. Alignment pins
5. Drill with 3/8" bit
6. New 3/8" stainless steel bolts
7. New 3/8" stainless steel nylon lock nuts
8. Hammer
9. Razor blade knife
10. Acetone
11. Clean terry cloth towel
12. Sealant (Sika Flex 1A)
13. Flexible putty knife

Repair Method

I. At the leaking joint, remove bolts in the area of the leak using the ratchet and wrench.

II. From the outside of the slide, use the hammer to pound the wood shims between the flanges. This is to spread the joint open to access the old sealant.

III. Cut the old sealant out with the razor blade knife. Remove any dirt and debris and clean the area with acetone.

IV. Apply a copious amount of new sealant to clean area. When done, remove wood shims. The flanges will close back together. If enough sealant was applied, it will spread to where the shims were. The sealant will also ooze onto the riding surface of the slide.

V. Using alignment pins, realign the joint to ensure that the downhill piece is not higher than the uphill piece. Rider discomfort or injury could result otherwise.

VI. Fill in all holes with new bolts and nuts — old washers can be used. Tighten with wrench and ratchet.

VII. Clean all excess sealant from the riding surface with the putty knife and cloth and acetone.

VIII. Allow up to twenty four hours for the sealant to properly cure. If this is not possible, allow as much time as possible.