

NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Sub-Committee

TECHNICAL BULLETIN - OCTOBER 1994

100. Fail Safe Braking Systems

There has been at least one serious incident this year where a safety related braking system has failed to danger, instead of to safety. Inspectors have also found instances of this problem where an incident has not occurred, but may have done so had the design not been changed.

The problem relates not only to Roller Coaster type devices that rely on the braking systems to prevent collision, but to any type of machine that relies on a braking system, either to bring the ride to a safe halt, or to hold the machine in a safe position whilst passengers embark and disembark.

An example of such a failure occurred when the brake on a "Top Spin" type machine released whilst passengers were leaving the ride. The platform started moving, resulting in at least one person being thrown from the device. This happened very soon after an initial test had taken place.

The brake in question was air operated but relied on the air supply to hold the brake in the on position. Insufficient air supply resulted in the release of the brake. Had the brake as fitted been designed to fail to safety, i.e. held off by the application of air and closed by mechanical spring mechanisms in compression, the insufficiency of air would not have caused any problem. It is then, however, important that the springs should have adequate fatigue life.

The independent Design Review should include a check that suitable safe systems are specified and this should be followed by confirmation during the initial test, by visual inspection and functional test, that they are fitted and that they operate correctly.

It should also be noted that a braking system includes the control, monitoring, and operating mechanisms, such as pneumatic or hydraulic valves, electrical relays etc. These devices should be designed to fail to the safe position.

It is also acceptable for the systems to be duplicated, so that redundancy is in place, provided that common mode failure has been taken into account. Any such system should also be monitored, so that any failure, such as a brake sticking in an open position is detected.

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