Elevating and Amusement Devices Safety Program	Ref. No.: 289 / 20
ADVISORY	Date: September 18, 2020

Subject: **Monitoring of Cylinder Corrosion Protection**
Distribution: TSSA website

This advisory clarifies TSSA's enforcement strategy around the design and maintenance requirements of cylinder corrosion protection (as specified by B44 requirements 3.18.3.8 and 8.6.5.11)

Requirements:
All forms of cylinder corrosion protection (specified in B44-10 requirement 3.18.3.8.1) require a means for ongoing checking per 3.18.3.8.2.

> **3.18.3.8 Cylinders Buried in the Ground**
> **3.18.3.8.1** Cylinders buried in the ground shall be protected from corrosion …
>
> **3.18.3.8.2** The methods specified in 3.18.3.8.3* shall be considered as acceptable, provided that they;
> a) are designed and installed with means for monitoring and maintaining them in accordance with accepted industry practices applicable to the methods
> b) are effective for specific conditions where the cylinder is installed
> c) provide means for checking ongoing compliance with 3.18.3.8.1

Under B44-13 requirement 8.6.5.11 (Maintenance) these monitoring means need to be examined and maintained to ensure they remain effective and are repaired or replaced if defective (8.6.5.11.2).

> **8.6.5.11.1 Corrosion Protection Monitoring.**
> Where monitored cylinder corrosion protection is required, the monitoring means shall be examined and maintained.
> **8.6.5.11.2 Corrosion Protection Loss.**
> If the monitoring means detects that loss of corrosion protection has occurred, the means of corrosion protection shall be repaired or replaced.

A17.1 Standards Committee approval of Inquiry 18-834 in May 2019 re-affirms the requirements to maintain and monitor all forms of cylinder corrosion protection identified in requirement 3.18.3.8.

As a component of Maintenance Control Program (MCP), requirement **8.6.5.11 Cylinder Corrosion Protection and Monitoring** would apply as a maintenance check item for installations with buried hydraulic cylinders, regardless of date of installation of the buried cylinder.

Additionally, for Ontario, any elevating device incorporating buried cylinders or buried piping shall have an Oil-Loss-Monitoring Program (OLM) as specified by requirement 2.9 of the elevating devices code adoption document (ED-CAD 277/19).

Issues:

1. Corrosion protection requirements were first introduced in B44 under the B44-M90s1-1992 edition, effective April 1, 1993. While Ontario has effectively dealt with buried ***single bottom cylinders***, there is a vintage of elevating device that utilizes ***double bottom construction (safety-bulkhead) cylinders***, but these cylinders may not be encased in a protective plastic casing (prior to April 1, 1993). As such, these installations pre-date code protection requirements and therefore, there is no protection nor any means to verify the integrity of the cylinder.

2. Despite the original code requirement (April 1, 1993): "the protective plastic casing shall be sealed and provided with means of inspection" many installations were not provided with effective means to inspect, so compliance with ongoing checking is not possible.

3. Per the requirements 8.6.5.11.2 (unchanged in A17.1-2000 through A17.1-2019) and adopted in Ontario as part of the harmonization of maintenance requirements as published in B44-2013 (effective May 1, 2013), failed corrosion protection systems "shall be repaired or replaced". In many cases the cost to remedy a failed corrosion protection system can be prohibitive, and current industry evidence suggests that no ***double bottom (safety-***

bulkhead) cylinder has failed in a catastrophic manner. Corrosion failures have generally been identified via an Oil Loss Monitoring Program as required by the CAD.

4. While corrosion protection monitoring is intended as a pre-emptive means to identifying failed corrosion protection and avoid cylinder failure/oil loss stemming from corrosion, there are many existing installations for which corrosion protection monitoring cannot be accomplished without extreme retrofit costs. Under these circumstances, the accepted mitigation strategy for such installations is a diligent OLM program.

5. Despite the CAD requirement to provide a diligent OLM program, there are still B44 code requirements to;
   a. provide protective corrosion protection and monitoring means in the design of new installations (3.18.3.8),
   b. examine and maintain the corrosion protection means (8.6.5.11).

Enforcement:

This table summarizes TSSA enforcement of hydraulic elevating device installations with buried cylinders and/or buried piping, as it relates to TSSA's "acceptance inspections" and "periodic inspection" activities.

<table>
<tr><th>Installations pre-dating corrosion protection requirements</th><th>Installations after April 1, 1993 & before October 1, 2020</th><th>Installations after October 1, 2020</th></tr>
<tr><td colspan="3">Maintenance and/or Periodic Inspection of OLM
1. A CAD required, contractor maintained, Oil Loss Monitoring (OLM) Program for elevating device installations with buried cylinders or buried piping applies
2. TSSA inspectors will verify OLM program and logs during periodic inspections

3. Installations which incorporated a single bottom cylinder were addressed by CAD 8.6.5.8 Safety Bulkhead which required the replacement of the cylinder, or addition of car safeties or a plunger gripper.</td></tr>
<tr><td></td><td colspan="2">Maintenance and/or Periodic Inspection of 8.6.5.11
Code requirement 8.6.5.11 addresses protection monitoring and maintenance requirements
4. Application of this 8.6.5.11 is the responsibility of the owner / maintaining contractor
5. Failed PVC or other failed monitoring systems shall be reported to the owner and record in the logbook
6. TSSA inspectors will not assess MCP logbooks entries of 8.6.5.11</td></tr>
<tr><td></td><td></td><td>Corrosion Protection Design and Testing
Code requirement 3.18.3.8 for design of protective means, and requirement 8.6.5.11 for means to examine
7. Contractor to provide a written checkout procedure in the MCP
8. During an Initial or relevant alteration (acceptance inspection*), TSSA will witness the testing of the protective means, per the procedure provided in the MCP.</td></tr>
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