

DISCUSSION

Comparison of Design Specifications for the Design of Pipe and Round HSS Pedestrian Guardrail Systems

Paper by THOMAS SPUTO
(2nd Q. 2002)

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The paper by Thomas Sputo gives professional credence to an analysis which many engineers, finding guardrails beneath their dignity, relegate to others with predictably erratic professional results.

In the section headed "LRFD LOAD FACTORS" Sputo argues against a load factor less than 1.6, but implicit permission for a lower load factor has been given in Section 1607.7.1.3 of the 2000 *International Building Code* where a one-third increase in allowable stress is sanctioned. Accordingly, ASD provides the most economical and esthetically desirable solution in jurisdictions governed by IBC 2000.

The writer uses the one-third increase for guardrails on stairs but does not use it for platforms where crowds assemble, an intuitive limitation intended to reflect the likelihood of sustained loading and supported by Commentary Section C4.4.2a in ASCE 7-02.

Unable to understand how horizontal loads can be applied at the top of a round member and believing that fabrication tolerances are accounted for by the Factor of Safety

or Resistance Factor, the writer uses 41.05 in. as the effective load height on a 1½-in. round Schedule 40 rail when mounted on a level base and 40 in. when mounted on a stringer flange, which is always more than an inch above the tread. The decreased height and higher allowable stress increase post spacing to 57.5 in. on a horizontal base and 60 in. on a stringer flange. Were one able to use the 1.3 wind load factor of yesteryear, a post spacing greater than the traditional 60 in. would be satisfactory in all cases.

The devil is still in the details and developing the base moment of a 1.9-in. O.D. pipe on a 1.5-in. flange is more important to guardrail safety than sophisticated member analysis. Avoiding beam rotation or concrete breakage remains the problem of the structural engineer, who can delegate the rail design but not the forces.

A paper by Professor Earle B. Norris of VPI (*Journal of Structural Engineering*, ASCE, Vol. 117, 1991) addresses the standardization of basic guardrail configurations, but to the writer's knowledge no further action was taken. This vacuum should be filled.

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