

The manufacturer
may use the mark:



Reports:

VIR 08/08-21 R003 FMEDA
Report V1 R1

VIR 08/08-21 R004 IEC
61508 Assessment Report
V1 R1

Validity:

This assessment is valid for
Metal Seated Floating Ball
Valve: ½"-12"

This assessment is valid
until January 1, 2012.

Revision 1.0 December, 2008

exida
Certification S.A.

Certificate / Certificat

Zertifikat / 合格証

VIR 080821 C003

exida hereby confirms that the:

Metal Seated Floating Ball Valve

**Virgo Engineers Limited / Virgo Valves and
Controls Limited, Pune, India**

Has been assessed per the relevant requirements of:

IEC 61508 Parts 1, 2

and meets requirements providing a level of integrity to:

Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Device

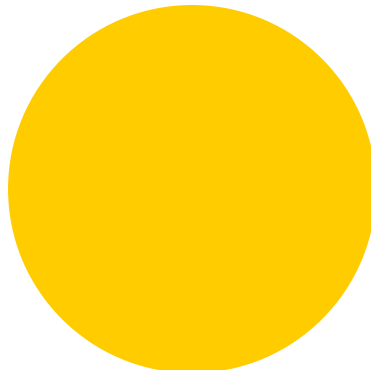
**PFD_{AVG} and Architecture Constraints must
be verified for each application**

Safety Function:

The Metal Seated Floating Ball Valve will move to the designed
safe position per the actuator design within the specified safety
time.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented
Function per the Safety Manual requirements.



Ch O'B

Product Assessor

William M. Goble

Auditor

Certificate / Certificat / Zertifikat / 合格証

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Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Device

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

SIL 3 Capability:

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated without "prior use" justification by end user or diverse technology redundancy in the design.

IEC 61508 Failure Rates

For valves used in a final element assembly, SIL must be verified for the specific application using the following failure rate data.

Failure rates for Metal Seated Ball Valves in FIT*

Device	λ_{SD}	λ_{SU}^2	λ_{DD}	λ_{DU}
Fail Closed – Full Stroke	0 FIT	909 FIT	0 FIT	532 FIT
Fail Closed – Tight Shutoff	0 FIT	33 FIT	0 FIT	1408 FIT
Fail Open	0 FIT	1140 FIT	0 FIT	302 FIT
Fail Closed – Full Stroke, PVST	0 FIT	909 FIT	181 FIT	351 FIT
Fail Closed – Tight Shutoff, PVST	0 FIT	33 FIT	181 FIT	1227 FIT
Fail Open – PVST	231 FIT	909 FIT	181 FIT	121 FIT

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

* FIT = 1 failure / 10⁹ hours

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**Metal Seated Floating
Ball Valve**

**Virgo Engineers
Limited / Virgo Valves
and Controls**

Pune, India

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Form	Version	Date
C61508	2.02	July 2008