



**BUREAU  
VERITAS**

## FAILURE MODE EFFECTS ANALYSIS SUMMARY

IT FILE 12.IT.1174048. 138 doc. n° P13021/12/GT/nb rev. 00

**Name and address of the manufacturer:** B.F.E. S.p.A. Via Tonale 70/A 24061 Albano S. Alessandro (BG)

**Type(s) of product and component manufactured:** Gate Valve

**Activity:** FMEA requested by B.F.E. S.p.A.

**Safety Function:** Valve close on demand by the safety system

**Product designation:** FORGED GATE VALVES (1/2" to 2") . Design Construction : Up to class 1500 - API 602, BS 5352, NF M87.412  
Class 2500 and 4500 – ANSI B16.34  
Ratings: According to ANSI B16.34 classes: 150, 300, 600, 1500, 2500 and 4500 lbs; According to API 602 class 800 lbs  
CAST VALVES (2" to 24"): Bolted bonnet valves are designed and manufactured to withstand the most severe working condition of the oil-petrochemical and power industries. Standards: API 600, ISO 10434, BS 1414, BS 1868, BS 1873 and ASME B16.34 where applicable and qualified in conformity with Pressure Equipment Directive 97/23/EC and ATEX 94/9/EC.

**Reference standards :** IEC 61508 part 1 and 2 Ed. 2 2010

**Report:** P130017/12/GT/nb rev.00

### RESULTS:

**Systematic integrity:** SIL 3 capable

**Random Integrity:** Type A component

PFD AVG and architecture constraints must be verified for each application.

Failure category	Failure rate (1/h)		Failure rate using PST (1/h)	
	Close on trip		Close on trip	
	Full stroke	Tight-shutoff	Full stroke	Tight-shutoff
Fail Dangerous Detected	0	0	2,80E-07	2,80E-07
Fail Dangerous Undetected	1,18E-06	1,90E-06	9,02E-07	1,62E-06

### Applications restrictions

The unit must be properly designed into a Safety Instrumented Function as per manufacturer instructions.  
The safety integrity level (SIL) of the entire safety instrumented function (SIF) must be verified through calculation of PFD AVG considering appropriate architectures, proof test interval, automatic diagnostics, repair time and specific failure rates of all products of the SIF. Each subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

Compiled by: N.Bergamo

  


Bureau Veritas Italia S.p.A.

Approved by: G.Tondetta

  


Date of issue: 5<sup>th</sup> March 2012



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## FAILURE MODE EFFECTS ANALYSIS SUMMARY

IT FILE 12.IT.1174048. 138 doc. n° P13018/12/GT/nb rev. 00

**Name and address of the manufacturer:** B.F.E. S.p.A. Via Tonale 70/A 24061 Albano S. Alessandro (BG)

**Type(s) of product and component manufactured:** Floating Ball Valve

**Activity:** FMEA requested by B.F.E. S.p.A.

**Safety Function:** Valve close on demand by the safety system

**Product designation:** Floating Ball Valves available in an extensive range of designs, materials, sizes (from 3/8" to 8") and pressure classes, in full conformance with ANSI, API and NACE specifications. All ball valves are designed in accordance with ASME B16.34 and where applicable with API 6D or BS EN ISO 17292.

**Reference standards :** IEC 61508 part 1 and 2 Ed. 2 2010 \*

**Report:** P130017/12/GT/nb rev.00

### RESULTS:

**Systematic integrity:** SIL 3 capable

**Random Integrity:** Type A component

**PFD AVG and architecture constraints must be verified for each application.**

Failure category	Failure rate (1/h)		Failure rate using PST (1/h)	
	Close on trip		Close on trip	
	Full stroke	Tight-shutoff	Full stroke	Tight-shutoff
Fail Dangerous Detected	0	0	3,56E-07	3,56E-07
Fail Dangerous Undetected	6,56E-07	1,26E-06	3,01E-07	9,03E-07

### Applications restrictions

The unit must be properly designed into a Safety Instrumented Function as per manufacturer instructions. The safety integrity level (SIL) of the entire safety instrumented function (SIF) must be verified through calculation of PFD AVG considering appropriate architectures, proof test interval, automatic diagnostics, repair time and specific failure rates of all products of the SIF. Each subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

Compiled by: N.Bergamo



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Date of issue: 5<sup>th</sup> March 2012



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## FAILURE MODE EFFECTS ANALYSIS SUMMARY

IT FILE 12.IT.1174048. 138 doc. n° P13022/12/GT/nb rev. 00

**Name and address of the manufacturer:** B.F.E. S.p.A. Via Tonale 70/A 24061 Albano S. Alessandro (BG)

**Type(s) of product and component manufactured:** Globe Valve

**Activity:** FMEA requested by B.F.E. S.p.A.

**Safety Function:** Valve close on demand by the safety system

**Product designation:** FORGED GLOBE VALVES (1/4" to 2")  
 Design Construction : Up to class 1500 - BS 5352, NF M87.412  
 Class 2500 and 4500 – ANSI B16.34  
 Ratings: According to ANSI B16.34 classes: 150,300,600,1500,2500, 4500 lbs  
 According to API 602 class 800 lbs  
 CAST VALVES (2" to 24"): Bolted bonnet valves are designed and manufactured to withstand the most severe working condition of the oil-petrochemical and power industries. The valves are in strict accordance with the API standard 600, ISO 10434, BS 1414, BS 1868, BS 1873 and ASME B16.34 where applicable and qualified in conformity with Pressure Equipment Directive 97/23/EC and ATEX 94/9/EC.

**Reference standards :** IEC 61508 part 1 and 2 Ed. 2 2010

**Report:** P130017/12/GT/nb rev.00

### RESULTS:

**Systematic integrity:** SIL 3 capable

**Random Integrity:** Type A component

PFDAVG and architecture constraints must be verified for each application.

Failure category	Failure rate (1/h)		Failure rate using PST (1/h)	
	Close on trip		Close on trip	
	Full stroke	Tight-shutoff	Full stroke	Tight-shutoff
Fail Dangerous Detected	0	0	6,28E-07	6,28E-07
Fail Dangerous Undetected	1,30E-06	2,91E-06	6,72E-07	2,29E-06

### Applications restrictions

The unit must be properly designed into a Safety Instrumented Function as per manufacturer instructions.  
 The safety integrity level (SIL) of the entire safety instrumented function (SIF) must be verified through calculation of PFDAVG considering appropriate architectures, proof test interval, automatic diagnostics, repair time and specific failure rates of all products of the SIF. Each subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

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