Italia

COMPLIANCE

with IEC EN 61508

Certificate No.: C-IS-722261618-01

CERTIFICATE OWNER: **Atos S.p.A.**
Via alla Piana 57
21018 Sesto Calende (VA)
Italy

WE HEREWITH CONFIRM THAT EXPLOSION-PROOF SOLENOID POPPET VALVES TYPE DLAH-2(3)* (EX DLOH-2(3)) AND XXXXXX DLAH-2(3)*, DLAH-2(3) / UL* (EX DLOH-2(3) / UL) AND XXXXXX DLAH-2(3) / UL*, DLAHX(S)-3 ATEX STAINLESS STEEL (EX DLOHX(S)-3) AND XXXXXX DLAHX(S)-3, DLAHM-3* AND XXXXXX DLAHM-3*, DLEH-2(3)* AND XXXXXX DLEH-2(3)*, DLEHM-3* AND XXXXXX DLEHM-3* MEET THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLES FOR THE SAFETY FUNCTIONS:

SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"

SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"

Examination result:	**The above reported Solenoid Valves were found to meet the standard defined requirements of the safety levels detailed in the following table (T-IS-722261618-01) according to IEC EN 61508, under fulfillment of the conditions listed in the Report R-IS-722261618-02 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Construction/Functional characteristics and reliability and availability parameters of the above Solenoid Valves**
Official Report No.:	**R-IS-722261618-01**
Expiry Date	**September, 14th 2024**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OFTHIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENT C-IS-722163008-01

Reference Standard **IEC EN 61508:2010 Part 2, 4, 6, 7**

Sesto San Giovanni, September, 15th 2021

TÜV ITALIA Srl

TÜV ITALIA Srl
Industry Service Division
Technical Manager
Paolo Marcone

Italia

SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLAH-2(3)* (ex DLOH-2(3)) and XXXXXX DLAH-2(3)* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	1,191E-08		1,191E-08	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	1,016E-08		1,038E-08	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	1,747E-09		1,535E-09	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLAH-2(3) (ex DLOH-2(3)) and XXXXXX DLAH-2(3)* produced by Atos S.p.A.*

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SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLAH-2(3) / UL* (ex DLOH-2(3) / UL) and XXXXXX DLAH-2(3) / UL* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	5,837E-09		5,837E-09	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	1,621E-08		1,654E-08	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	2,785E-09		1,535E-09	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLAH-2(3) / UL (ex DLOH-2(3) / UL) and XXXXXX DLAH-2(3) / UL* produced by Atos S.p.A.*

T-IS-722261618-01
NOTE: The present table is integral part of the Document: C-IS-722261618-01
Date: September, 15th 2021

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SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLAHX(S)-3 ATEX Stainless Steel (ex DLOHX(S)-3) and XXXXXX DLAHX(S)-3 produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	1,899E-08		1,899E-08	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	4,981E-09		5,085E-09	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	8,561E-10		7,523E-10	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLAHX(S)-3 ATEX Stainless Steel (ex DLOHX(S)-3) and XXXXXX DLAHX(S)-3 produced by Atos S.p.A.

T-IS-722261618-01
NOTE: The present table is integral part of the Document: C-IS-722261618-01
Date: September, 15th 2021

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SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLAHM-3* and XXXXXX DLAHM-3* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	1,088E-07		1,088E-07	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	5,548E-08		7,252E-08	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	5,331E-08		3,626E-08	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLAHM-3 and XXXXXX DLAHM-3* produced by Atos S.p.A.*

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SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLEH-2(3)* and XXXXXX DLEH-2(3)* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	6,596E-09		6,596E-09	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	3,364E-09		4,397E-09	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	3,232E-09		2,199E-09	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLEH-2(3) and XXXXXX DLEH-2(3)* produced by Atos S.p.A.*

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SUMMARY TABLE

T-IS-722261618-01

E/EE/EP safety-related system (final element)	**Solenoid Valves DLEHM-3* and XXXXXX DLEHM-3* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single solenoid poppet valve on demand, by external energization signal"*		*SIF2: "Switching of the single solenoid poppet valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	9,831E-09		9,831E-09	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	5,014E-09		6,554E-09	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	4,817E-09		3,277E-09	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DLEHM-3 and XXXXXX DLEHM-3* produced by Atos S.p.A.*

T-IS-722261618-01
NOTE: The present table is integral part of the Document: C-IS-722261618-01
Date: September, 15th 2021

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COMPLIANCE

with IEC EN 61508

Certificate No.: C-IS-722261618-02

CERTIFICATE OWNER: **Atos S.p.A.**
Via alla Piana 57
21018 Sesto Calende (VA)
Italy

WE HEREWITH CONFIRM THAT SOLENOID VALVES

TYPE DHA* AND XXXXXX DHA*, DHA / UL* AND XXXXXX DHA / UL*,

DHAX(S) ATEX STAINLESS STEEL AND XXXXXX DHAX(S)

MEET THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLES

FOR THE SAFETY FUNCTIONS:

SIF1: "Switching of the single or double solenoid spool valve on demand, by external energization signal"

SIF2: "Switching of the single or double solenoid spool valve on demand, by external de-energization signal"

Examination result:	**The above reported Solenoid Valves were found to meet the standard defined requirements of the safety levels detailed in the following table (T-IS-722261618-02) according to IEC EN 61508, under fulfillment of the conditions listed in the Report R-IS-722261618-02 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Construction/Functional characteristics and reliability and availability parameters of the above Solenoid Valves**
Official Report No.:	**R-IS-722220682-01**
Expiry Date	**September, 14th 2024**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OFTHIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENT C-IS-722163008-02

Reference Standard **IEC EN 61508:2010 Part 2, 4, 6, 7**

Sesto San Giovanni, September, 15th 2021

TÜV ITALIA Srl

TÜV ITALIA Srl
Industry Service Division
Technical Manager
Paolo Marcone

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SUMMARY TABLE

T-IS-722261618-02

E/EE/EP safety-related system (final element)	**Solenoid Valves DHA* and XXXXXX DHA* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single or double solenoid spool valve on demand, by external energization signal"*		*SIF2: "Switching of the single or double solenoid spool valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	3,334E-09		3,334E-09	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	2,277E-09		3,049E-09	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	1,057E-09		2,845E-10	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DHA and XXXXXX DHA* produced by Atos S.p.A.*

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SUMMARY TABLE

T-IS-722261618-02

E/EE/EP safety-related system (final element)	**Solenoid Valves DHA / UL* and XXXXXX DHA / UL* produced by Atos S.p.A.**			
System type	Type A			
Systematic Capability	*SC3*			
Safety Function Definition	*SIF1: "Switching of the single or double solenoid spool valve on demand, by external energization signal"*		*SIF2: "Switching of the single or double solenoid spool valve on demand, by external de-energization signal"*	
Max SIL(1)	**SIL2 with HFT=0**	**SIL3 with HFT=1**	**SIL2 with HFT=0**	**SIL3 with HFT=1**
λ_{TOT}	6,915E-09		6,915E-09	
λ_{NE}	0,000E+00		0,000E+00	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	4,722E-09		6,325E-09	
$\lambda_{DD,PST}$(2)	0,000E+00		0,000E+00	
$\lambda_{DU,FPT}$	2,193E-09		5,901E-10	
β and β_D factor	10%		10%	
MRT	0,25 h		0,25 h	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DHA / UL and XXXXXX DHA / UL* produced by Atos S.p.A.*

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SUMMARY TABLE

T-IS-722261618-02

E/EE/EP safety-related system (final element)	**Solenoid Valves DHAX(S) ATEX Stainless steel and XXXXXX DHAX(S) produced by Atos S.p.A.**	
System type	Type A	
Systematic Capability	*SC3*	
Safety Function Definition	*SIF1: "Switching of the single or double solenoid spool valve on demand, by external energization signal"*	*SIF2: "Switching of the single or double solenoid spool valve on demand, by external de-energization signal"*
Max SIL(1)	**SIL2 with HFT=0** / **SIL3 with HFT=1**	**SIL2 with HFT=0** / **SIL3 with HFT=1**
λ_{TOT}	3,922E-09	3,922E-09
λ_{NE}	0,000E+00	0,000E+00
λ_{SD}	0,000E+00	0,000E+00
λ_{SU}	2,679E-09	3,588E-09
$\lambda_{DD,PST}$(2)	0,000E+00	0,000E+00
$\lambda_{DU,FPT}$	1,244E-09	3,347E-10
β and β_D factor	10%	10%
MRT	0,25 h	0,25 h
Hardware Safety Integrity	Route 2_H	Route 2_H
Systematic Safety Integrity	Route 2_S	Route 2_S

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Test.

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Solenoid Valves DHAX(S) ATEX Stainless steel and XXXXXX DHAX(S) produced by Atos S.p.A.

T-IS-722261618-02
NOTE: The present table is integral part of the Document: C-IS-722261618-02
Date: September, 15th 2021