

# SIL



## Functional Safety Certificate

**No. 0P211208.KVCW26**

Technical Construction File No. TCF-AR-KC-SIL-02

**Certificate's Holder:** KACE VALVES (HANGZHOU) CO., LTD.  
No. 16, Kanghui Road, Gongshu District, Hangzhou, P. R. China

**Product:** Trunnion Ball Valves  
**Model(s):** T1, T2, T3, T4, T1M, T2M, T3M, T4M, TE1, TE2, TE3, TE4, TE1M, TE2M, TE3M, TE4M, TX1, TX2, TX3, TX4, TX1M, TX2M, TX3M, TX4M, TC1, TC2, TV, TVM, ML(3)T, MT(3)T, MY(3)T, MML(3)T, MMT(3)T, MMY(3)T, W3, W4, G1, G2, G1M, G2M, GX1, GX2, GX1M, GX2M, GS1, GS1M, 80TM

**Standard:** Has been assessed per the relevant requirements of:  
IEC 61508:2010 Ed2- Parts 1, 2, 4

And meets requirements providing a level of integrity to:  
Systematic Capability: SC 3 (SIL 3 Capable)  
Random Capability: Type A Element  
SIL 2 @ HFT= 0; SIL 3@ HFT=1; Route 2<sub>H</sub>  
PFD<sub>AVG</sub> and Architecture Constraints must be verified for each application.

\* Safety Function:

Open or close on demand.

\* Application Restrictions:

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

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

**Date of issue 10 December 2021**

**Expiry date 07 December 2026**

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# Annex I

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- The use of the product [T, M, W, G, 80 series Trunnion Ball Valves] must obey the required rules to conservation of SIL3 properties, these rules are recalled in the §6 of the Assessment Report reference: [TCF-AR-KC-SIL-02].
- The product version of hardware components used for validation and type tests are the following:

Component	Model
Trunnion ball valve of split body, soft seated, full /reduced bore, adjustable packing/O-ring stem seal	T1, T2, T3, T4
Trunnion ball valve of split body, metal seated, full /reduced bore, adjustable packing/O-ring stem seal	T1M, T2M, T3M, T4M
Trunnion ball valve of top entry body, soft seated, full /reduced bore, adjustable packing/O-ring stem seal	TE1, TE2, TE3, TE4
Trunnion ball valve of top entry body, metal seated, full /reduced bore, adjustable packing/O-ring stem seal	TE1M, TE2M, TE3M, TE4M
Trunnion ball valve of split body, soft seated, extended bonnet, full/reduced bore, adjustable packing/O-ring stem seal	TX1, TX2, TX3, TX4
Trunnion ball valve of split body, metal seated, extended bonnet, full/reduced bore, adjustable packing/O-ring stem seal	TX1M, TX2M, TX3M, TX4M
Trunnion ball valve of split body, soft seated, full/reduced bore, adjustable packing, cryogenic	TC1, TC2
Trunnion ball valve of split body, V-Port ball, soft/metal seated	TV, TVM
Trunnion ball valve of 3-Way "L/T/Y" Port, soft seated	ML(3)T, MT(3)T, MY(3)T
Trunnion ball valve of 3-Way "L/T/Y" Port, metal seated	MML(3)T, MMT(3)T, MMY(3)T
Trunnion ball valve of welded body, soft seated, full/reduced bore, O-Ring stem seal	W3, W4
Trunnion ball valve of split body, soft seated, full/reduced bore (severe service)	G1, G2
Trunnion ball valve of split body, metal seated, full/reduced bore (severe service)	G1M, G2M
Trunnion ball valve of split body, soft seated, extended bonnet, full/reduced bore (Severe Service)	GX1, GX2
Trunnion ball valve of split body, metal seated, extended bonnet, full/reduced bore (Severe Service)	GX1M, GX2M
Trunnion ball valve of split body, full bore, soft/metal seated (single seat)	GS1, GS1M
Trunnion ball valve of three-piece body, metal seated, full bore, NPT, BW, Socket welding end	80TM

- Acceptable environmental constraints for the system are recalled in the safety Manual [SM-KC-02]. These elements must be checked for each integration operation of the product.
- The certified Safety Function(s) of product [T, M, W, G, 80 series Trunnion Ball Valves] is (are) the following:
  - SF1: Open or close on demand.
- Hypothesis used for mode of operation is the following:
  - The mode of operation is Low demand, which means less than 1 trip demand each year.

Component architecture	Safety Function	SIL Capacity	Probability of Failure on Demand
1oo1 configuration	SF1	SIL 2	7.69E-04
1oo2 configuration	SF1	SIL 3	7.75E-05

Test Intervals	MTTR	SFF	Undetected Dangerous Failure Rate ( $\lambda Du$ )
12 months	24 h	N/A	1.74E-07
12 months	24 h	N/A	N/A

- The Safety Integrated Level of the safety function using the product [T, M, W, G, 80 series Trunnion Ball Valves] shall be calculated taking into account the characteristics of the complete system supporting the safety function.