



# Chlorine Detector type 4501-06

Office: **Aberdeen**

Date: **02 May 2013**

This certificate is issued to **Sierra Monitor Corporation, 1991 Tarob Court, Milpitas, CA 95035, USA**

## Component Description

Chlorine Cl<sub>2</sub> Detector (including sensor head) instrument

## Component Identification

Model 4501-06

This certificate is issued to the above manufacturer to certify that Lloyd's Register EMEA have examined a Failure Mode and Effect Analysis performed by Technis (Dr David Smith) and assisted by Sierra Monitor Corporation (Franco Giangregorio) and verify the findings are correct in the following respects:

1. In respect of the failure mode (**Failure to Respond to a predetermined gas concentration by means of a 4-20mA signal**), the demonstration (by means of failure mode and effect analysis) of >90% safe failure fraction which makes it suitable for **SIL 2** application when used in a simplex mode, without redundancy as detailed in Technis report T668.
2. A probability of failure on demand (based on FMEA) of **9.8 10<sup>-4</sup>** assuming a proof test interval of 12 months and a repair time of 24 hours as detailed in Technis report T668
3. Appropriate control over purchased materials.
4. Independence of the review and assessment as detailed in Technis report T668 is confirmed.
5. Components are as listed in Technis report T668.
6. The detector(s) must be correctly designed into a Safety Instrumented Function per the requirements of the Safety Manual.
7. The results of the proof tests and any revealed failures need to be correctly recorded and analysed to ensure the integrity requirements are met throughout the lifecycle of the plant/process.

## Applicable Standards

IEC 61508 – Functional Safety of Electrical/Electronic/ Programmable Electronic Safety Related Systems

## Design Temperature

Temperature rating: -40°C min. to +80°C max (unless stated in applicable certification)

## Maintenance schedule

It is recommended that a periodic visual and operation evaluation is carried at least once a year.

## Product life

As determined by the maintenance schedule above

## Control of Internal Production Compliance

ISO 9001:2008 ASR Certificate Number 4539 issued April 26, 2011, Valid until April 25, 2014

This certificate is issued to the above client to certify that the detector described herein has been subjected to a Failure Modes and Effects Analysis in accordance with the requirements of Lloyds Register and the standards indicated above.

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid Certificate

Date of issue: **2nd May, 2013**

Expiry date: **1st May, 2018**

Ian Harris  
Surveyor to Lloyd's Register EMEA

A member of the Lloyd's Register Group