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SIL - SAFETY INTEGRITY LEVEL

For the professional execution of safety systems (Safety Instrumented System: SIS) in the process industry, proof of compliance with the required safety integrity level (SIL) must be documented as part of the safety life cycle. During the hazard analysis and risk assessment, safety functions (Safety Instrumented Function: SIF) are identified and evaluated with a required SIL. For each safety function performed with a safety system, the achievable SIL can be determined for systematic and random failures. This must be identical or better than the required SIL. The engineers of the weyer group calculate the respective SIL level of the system based on the data provided by the manufacturers.

1. Review of systematic failures

The weyer group checks the achievable SIL in relation to the hardware fault tolerance (HFT) and the proportion of non-hazardous failures (SFF) of subsystems. Thus, a qualitative assessment of the protective circuit of the system is carried out by the inspection. Depending on the necessity, improvements can be achieved here through redundant design or suitable device selection or diversity.

2. Random failure check

Random failures of the hardware are assessed by calculating the mean probability of failure on demand (PFDavg) or mean probability of failure per hour (PFHavg). For this purpose, the manufacturer's data on the failure rate of the devices from the SIL declaration of conformity are used. If these cannot be provided, the weyer group specialists use statistical surveys by organisations such as Exida or Namur.

Our offer

Verification of systematic failures
Verification of random failures

Assessment according to standards

SIL project management

For the calculation, weyer group engineers use software tools certified by TÜV.

The software can be used to determine the interval of the retest and shows the percentage of the subsystems in relation to the probability of failure of the overall system. Redundant structures and/or a suitable selection of equipment allow the components for subsystems to be optimised in order to achieve the required SIL. The engineers of the weyer group assess the use of devices with a low SIL rating in redundant structures with regard to cost savings in your plant. The data obtained in the process can be used for documentation.

3. Assessment according to standards

For the assessment of your plant, the engineers of the weyer group make use of the standards DIN EN 61508, DIN EN 61511 and VDI/VDE 2180, which describe the requirements for safety-related functions in process technology that are implemented with safety systems. This ensures that the currently valid standards are met.

4. SIL-Project management

The safety functions (SIF) and the required SIL are determined and documented by a previously performed HAZOP. The subsystems sensor(s), logic system and actuator(s) with the necessary instrumentation for each safety function are assigned to the safety system (SIS) as a loop. The architecture and fault tolerance of the safety system is determined by the weyer group engineers. Then the suitable devices (sensors and actuators) and their operating conditions must be specified, as well as the safety-related control (logic system) (e.g. explosion protection). If the manufacturer data (HFT, SFF and failure rates) for calculating the failure probabilities for all components of the subsystems are not available, the necessary data for calculation are obtained by the engineers of the weyer group.

As soon as this data is completely available, the interval for the recurring inspection can be determined. In the process, all calculations are documented by the specialists of the weyer group. If necessary, alternative devices or structures must be selected to extend the test intervals of your system. In the process, non-identical inspection intervals of safety systems can be aligned with each other and used for a uniform maintenance date.

Your benefit

We assess your plants / systems with regard to the reliability of safety functions.

The safety-related availability of your plants is increased.

We support the plant operator within the framework of the legally required proof of risk reduction.

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References (excerpt):

- DHC Solvent Chemie GmbH (Mülheim a. d. Ruhr, GER): Consultancy services on the safety integrity level
- Neenah Gessner GmbH (Feldkirchen-Westerham, GER): Demonstration of the safety integrity level for a resin cooker
- Scheuch GmbH (Aurolzmünster, AT): Calculation of the safety integrity level for a Deconox system
- Z&J Technologies GmbH (Düren, GER): SIL classifications for valves

The weyer group is an independent group of engineering and consulting companies in Germany, Austria, Switzerland and Poland.

Always based on the expectations and wishes of our customers, the weyer group has developed a wide range of competences since 1976.

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