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Getting Started Safety Evaluation in the TIA Selection Tool

Safety Integrated

Siemens Industry Online Support

Table of contents

1 General

1.1 Legal notes on the Safety Evaluation function

Use of the Safety Evaluation function

With the Safety Evaluation function, you can quickly and easily evaluate safety functions according to the standards IEC 62061 and ISO 13849-1 and then create a report for your documentation. The Safety Evaluation function is a free service provided by Siemens AG and/or a subsidiary of Siemens AG ("Siemens"), which you can use within the TIA Selection Tool. The result of the evaluation is non-binding and is not guaranteed to be complete and functional. You yourself are responsible for proper and safe operation of products in line with applicable regulations and, for this purpose, you must check the functioning of the respective application example and individually adapt it to your system.

You receive from Siemens the non-exclusive, non-sublicensable and non-transferable right to usage of the Safety Evaluation function within the TIA Selection Tool by trained personnel.

Exclusion of liability

Siemens accepts no liability, regardless of the legal grounds, in particular for the usability, availability, completeness and correctness of the Safety Evaluation function, as well as associated results, notes, performance data and damage resulting from this. Siemens' liability is also excluded if you use outdated versions of the TIA Selection Tool and/or incorporate external libraries. This does not apply if Siemens has mandatory liability, e.g. under the German Product Liability Act (Produkthaftungsgesetz), in case of intent, gross negligence, or culpable injury to life, body or health, non-compliance with a provided guarantee, fraudulent concealment of a deficiency or breach of substantial contractual obligations. The damages for a breach of a substantial contractual obligation are, however, limited to the foreseeable damage, typical for the type of contract, except in the event of intent or gross negligence or injury to life, body or health. The above provisions do not entail a change in the burden of proof to your disadvantage. You release Siemens from any existing or pending claims of third parties in this context, unless Siemens has mandatory liability.

By using the Safety Evaluation function, you acknowledge that Siemens cannot be made liable for any claims beyond the liability clause described.

Additional notes

Siemens reserves the right to make changes to the Safety Evaluation function at any time and without notice.

Using and Importing VDMA libraries

Use of the Safety Evaluation function is only permitted if you are using the latest version of the TIA Selection Tool. If you are using older versions of the TIA Selection Tool or additional VDMA libraries from third parties ("external libraries"), you alone are responsible for their use and selection of the version. You need to independently ensure that the current version of the external library is used. Working with old project versions or old versions of external libraries can lead to errors in processes and to incorrect use.

1.2 Description of functionality

The free Safety Evaluation in the TIA Selection Tool for the standards IEC 62061 and ISO 13849-1 will help you accomplish your goal directly.

Standard-compliant safety calculations and plant configuration all in one? Does that work? The Safety Evaluation in the TIA Selection Tool is a central tool that helps you meet your requirements with regard to the Machinery Directive in a cost-effective and reliable manner. You decide whether you want to use Safety Evaluation according to IEC 62061 or ISO 13849-1 with the corresponding final report.

1.3 Requirements

A requirement for using the Safety Evaluation is that you first perform a risk analysis in which the resulting safety functions are defined. Here, you must always select the logical functions with hardware subfunctions already conceived (e.g. Detection, Evaluation and Reaction). The persons responsible (project manager and project auditor) must also be named for the subsequent acceptance tests.

Required basic knowledge:
- Using the TIA Selection Tool
- General knowledge in the field of functional safety
- Risk assessment and risk reduction according to ISO 12100
- Design of safety systems according to ISO 13849 and IEC 62061

2 What remains the same?

The following provides you with an overview of the functions that have been taken from the Safety Evaluation Tool (SET):

- Support in the use of standards and the fulfillment of the duty of proof
- Safety Evaluation according to IEC 62061 and ISO 13849
- Generation of a final report in conformity with the standards

3 What's new?

The following provides you with an overview of the additions and changes to content compared to the previous Safety Evaluation Tool (SET):

New "Safety Evaluation" feature in the TIA Selection Tool

- Central tool for standard-compliant safety calculations and plant configuration
- Support with plant configuration and the selection of safety components
- Cost-effective configuration of safety functions by avoiding misconfigurations
- Integration of a safety-related perspective in the workflow for the configuration and selection of devices for a wide variety of automation projects

Fast, easy and stress-free access to a standard-compliant Safety Evaluation for your desired plant configuration

Take advantage of the integration into the TIA Selection Tool and see for yourself the benefits of an integrated Safety Evaluation in the TIA Selection Tool and how easy it is to perform a standard-compliant Safety Evaluation within the framework of plant configuration.

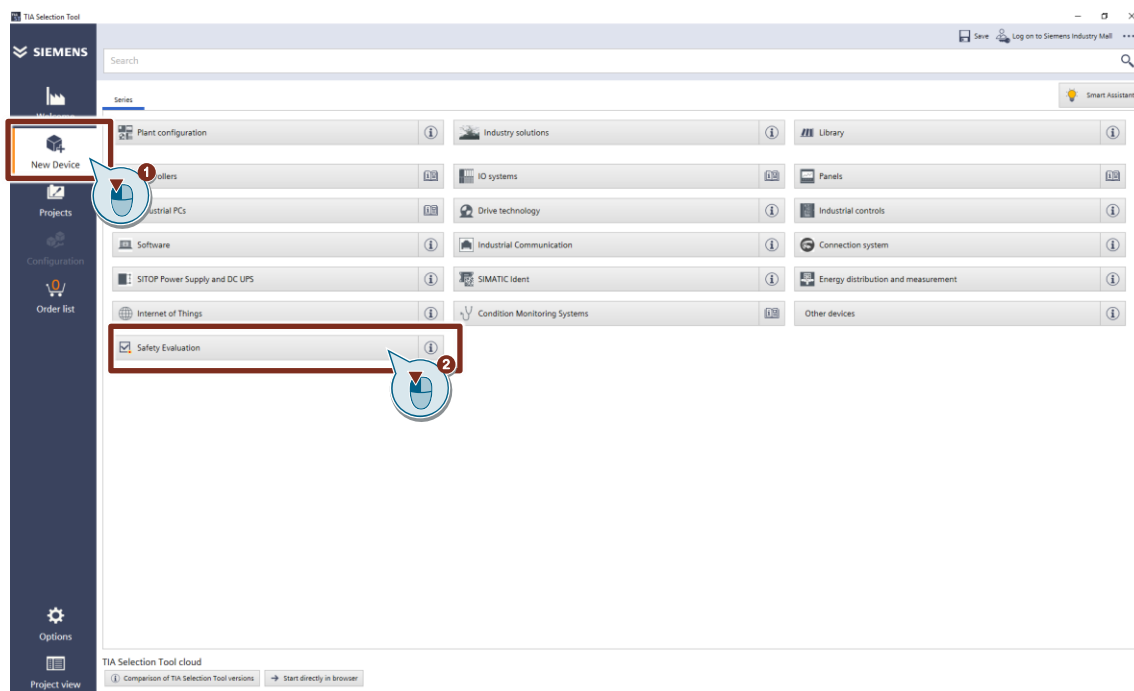# 4 Opening the Safety Evaluation

4.1 Starting the application

Offline tool

https://www.siemens.com/tia-selection-tool-standalone

4.2 Starting the Safety Evaluation
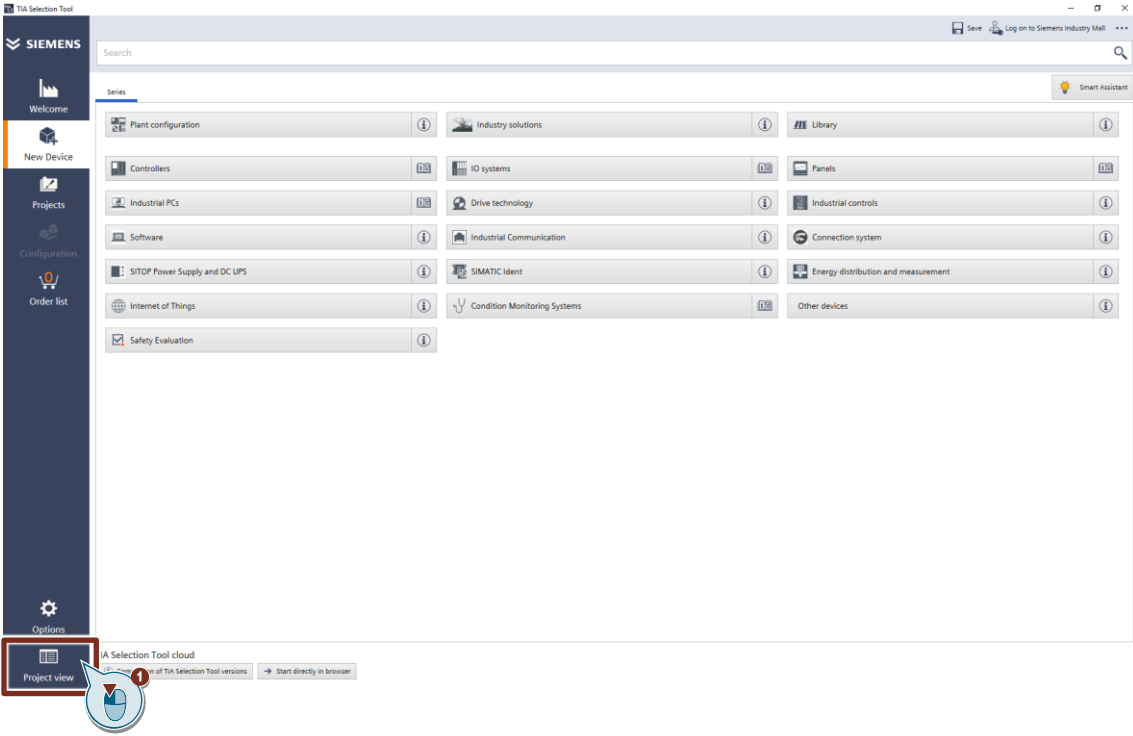
4.2.1 Opening from the Portal view

Figure 4-1 Safety Evaluation in the Portal view

1 ———— Select "New Device" in the left page navigation
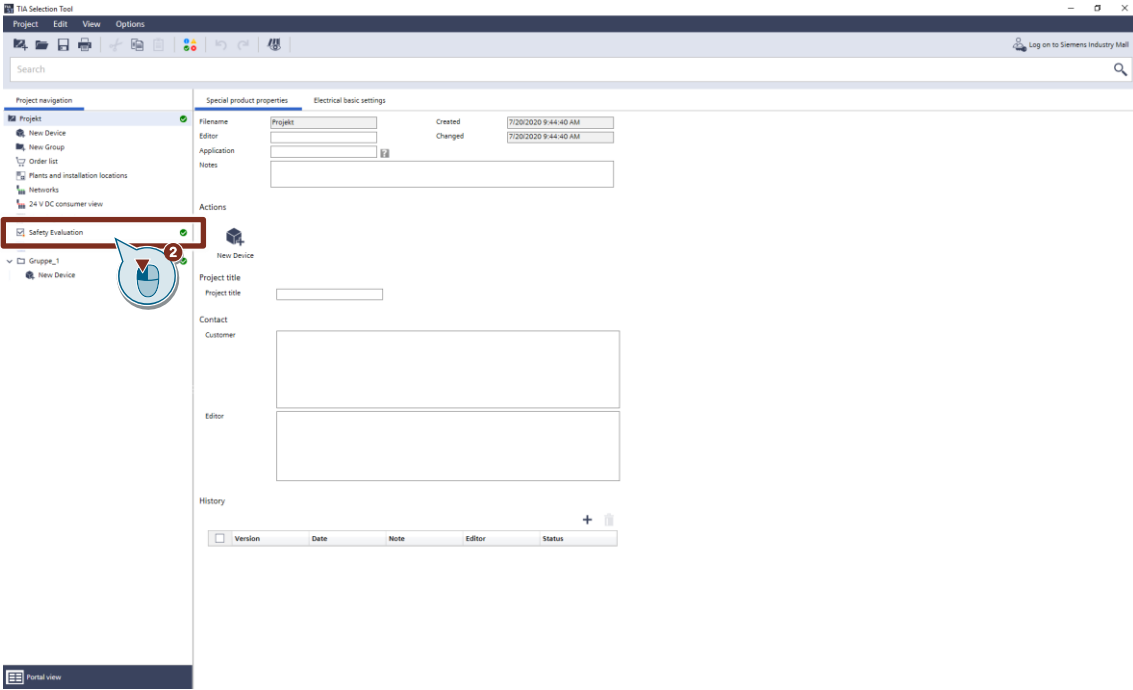2 ———— Select "Safety Evaluation" in the list of product families

4.2.2 Opening from the Project view

Figure 4-2 Switching to the Project view

1 ───── Switch to the "Project" view

Figure 4-3 Safety Evaluation in the Project view

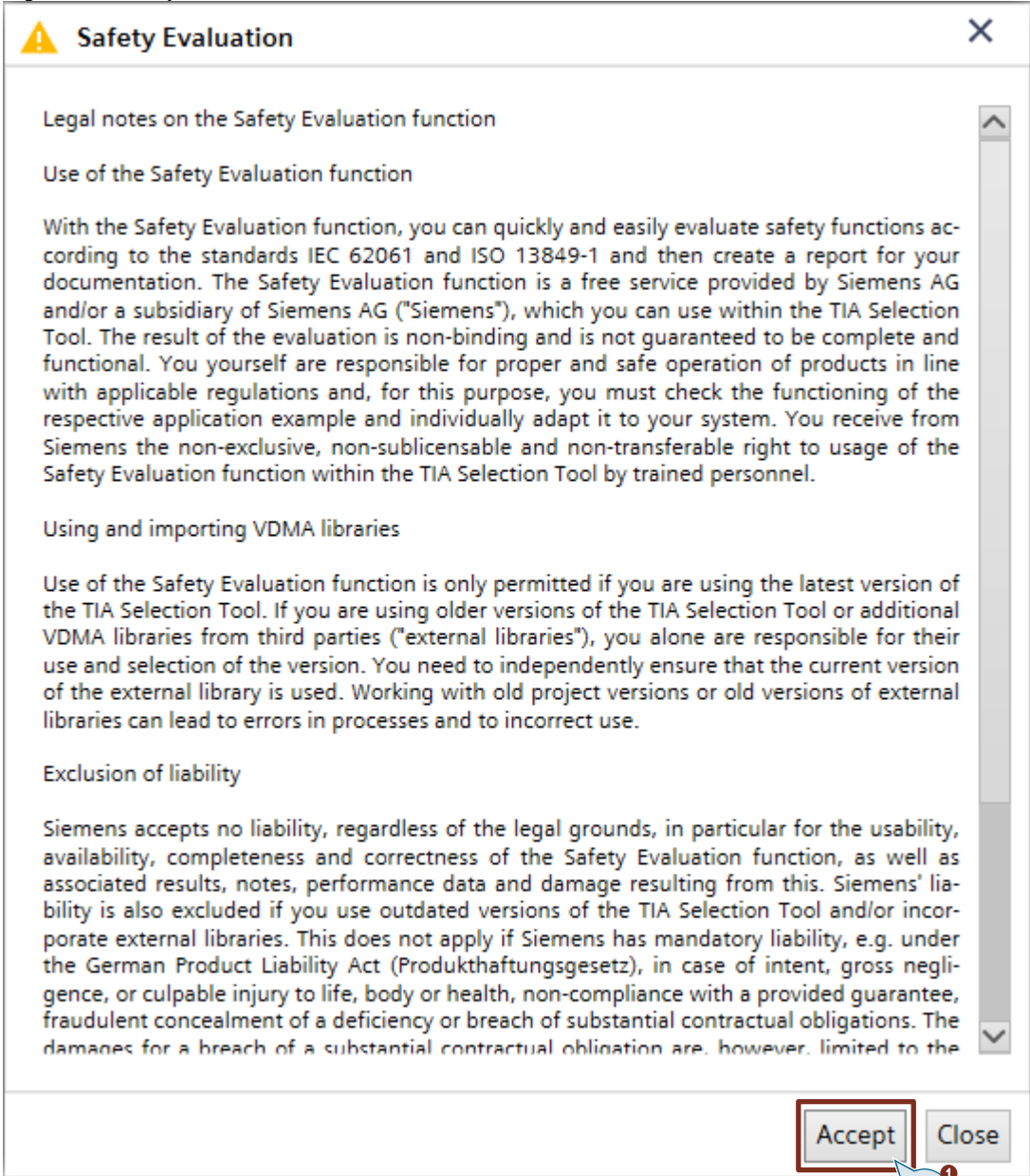2 ───── "Safety Evaluation" selection in the page navigation

4.2.3 Confirmation of the disclaimer

When you open the Safety Evaluation, you are asked to confirm the legal information and the disclaimer.

Read the displayed message carefully and confirm the terms of use for the Safety Evaluation:

1 ———— "Accept"

Figure 4-4 Safety Evaluation disclaimer

The information appears again when generating the report and in the results report itself.
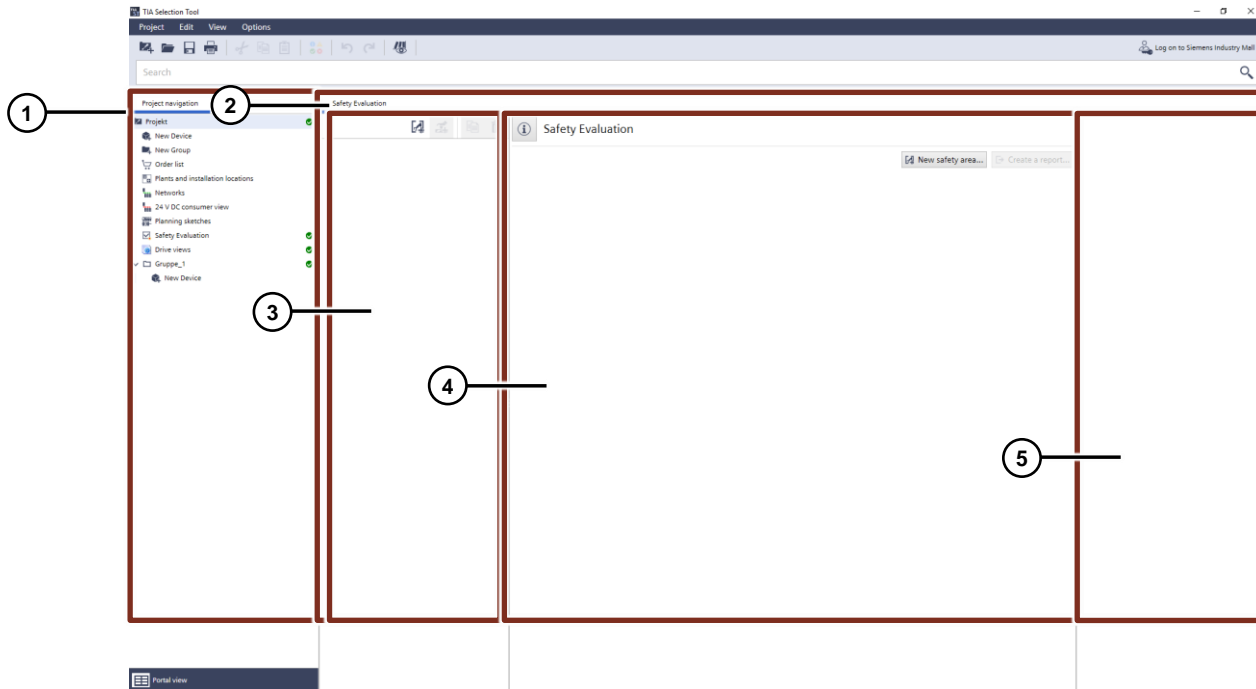
5 Operating the Safety Evaluation

The basic procedure of the Safety Evaluation is explained below based on an example.

5.1 Layout of the screens

The following section explains the different areas of the Safety Evaluation.

Figure 5-1 Safety Evaluation screens

1	Project navigation from the TIA Selection Tool
2	User interface of the Safety Evaluation
3	Management area of the safety areas and functions
4	Configuration area of the safety functions
5	Display of compatible safety-relevant devices from the TST project for use in the Safety Evaluation

5.1.1 Project navigation

(1) The project navigation contains the "Safety Evaluation" category, which opens the user interface for configuration of safety areas and functions.

(2) The devices created in the TIA Selection Tool can be added to the safety functions, provided they are safety-relevant devices.

Figure 5-2 Project navigation in the Safety Evaluation
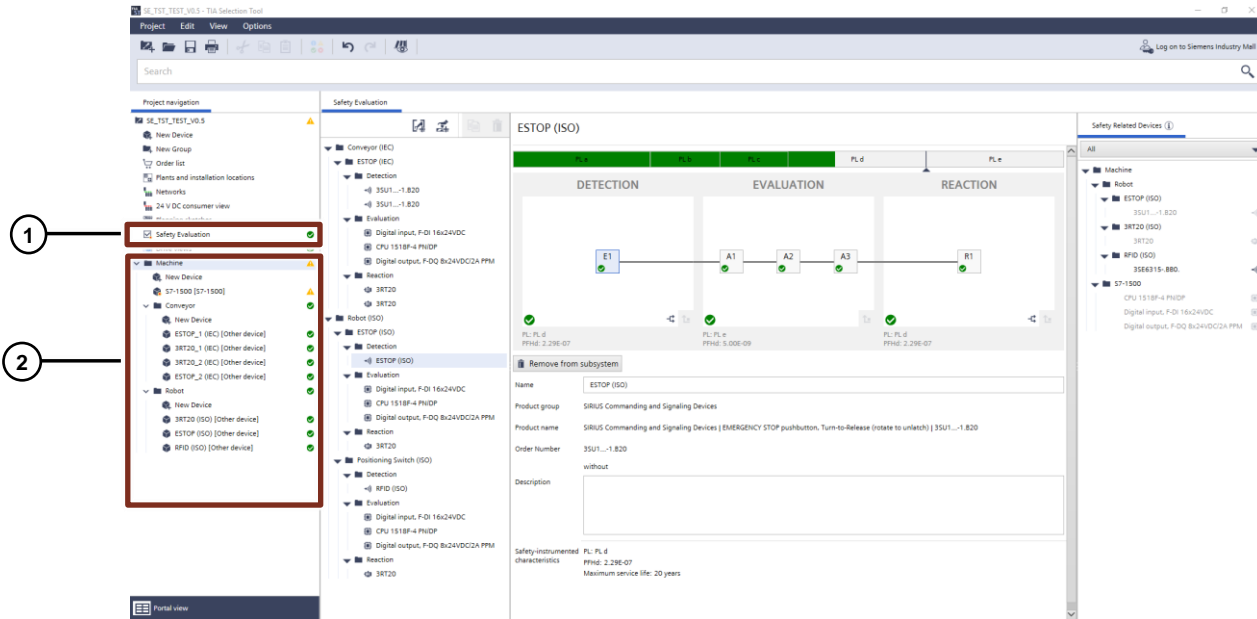
## 5.1.2 Management area of the safety areas and functions

① In the management area of the Safety Evaluation, different safety areas can be created, duplicated and deleted according to the standards IEC 62061 and ISO 13849-1 with the corresponding safety functions.

② The management area of the Safety Evaluation therefore displays the currently created safety areas, safety functions, their subsystems and devices (Sensor , Evaluation unit , Actuator).

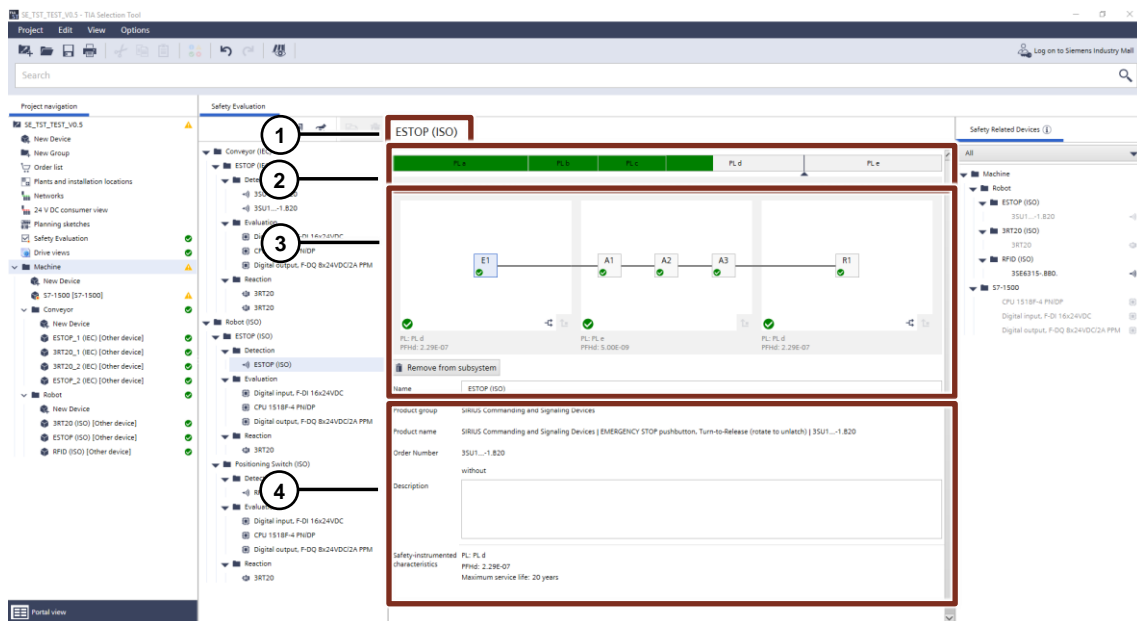Figure 5-3 Management area of the Safety Evaluation
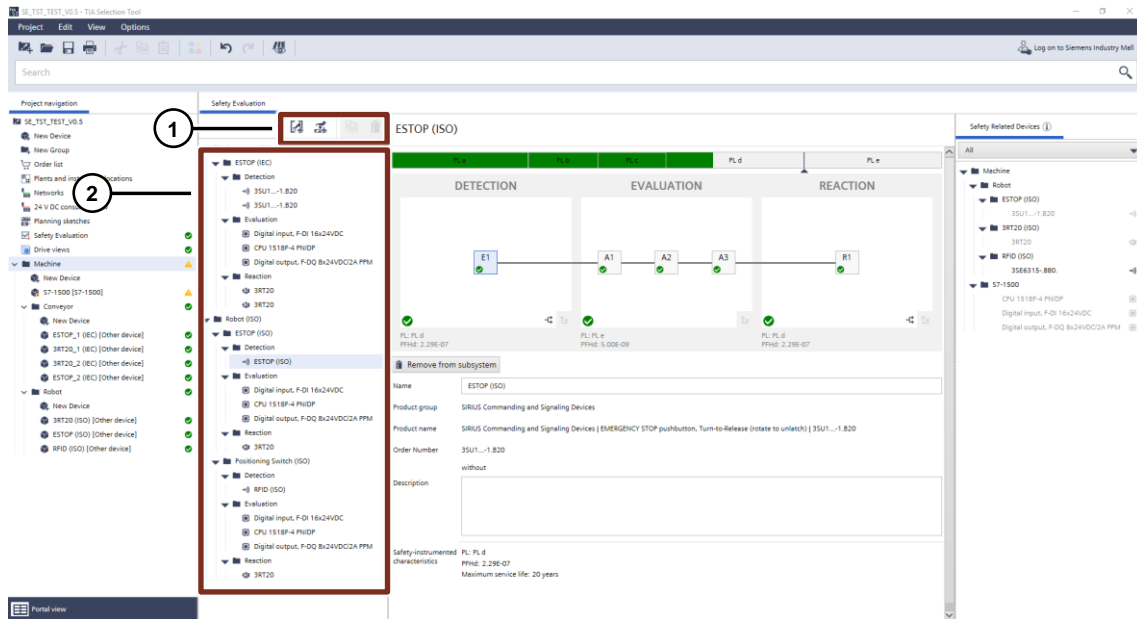
5.1.3 Configuration area of the safety functions

The configuration area of the safety functions represents the core function of the Safety Evaluation. All safety-related calculations for the evaluation of the safety functions take place here.

1 — Name of the safety function

2 — Indication of the required and achieved safety level (SIL/PL) with color highlighting to meet the requirement (red / green)

3 — Representation of the cause and effect chain of the safety function according to the Detection, Evaluation and Reaction subsystems with indication of the devices contained therein (Ex, Ax, Rx) and the safety level achieved in the subsystem (SIL/PL and PFHd)

4 — Properties (different screens for safety areas, safety functions and devices)

Figure 5-4 Configuration area of the Safety Evaluation

Properties of safety areas

When a safety area is selected in the management area of the Safety Evaluation, its properties are displayed. The following settings can be made or viewed here:

① Name of the safety area

② Standard applied within the safety area

③ Description of the safety area

④ Option to create a new safety function within the safety area

⑤ Option to generate the results report of the Safety Evaluation

Figure 5-5 Properties of safety areas

Properties of safety functions

When a safety function is selected in the management area of the Safety Evaluation, the properties of the safety function are displayed below the cause and effect chain. Like the safety areas, however, in addition to the name and description

① the required safety level (SIL or PL)

② and the safety area to which the safety function belongs are listed here.

③ In addition, the required safety level can be (re)assessed (see 5.3.6)

④ and the result (SIL/PL and PFH_d value) can be viewed.

Figure 5-6 Properties of safety functions

Properties of devices

When a device is selected in the management area of the Safety Evaluation, the properties of the respective device are displayed below the cause and effect chain. Name and description are freely selectable once again.

① The properties of the product group, the product name and the order number come, depending on their origin, either from the TIA Selection Tool or the VDMA characteristic value library.

② The button above the properties allows the device to be removed from the currently assigned subsystem.

③ In addition to the result (SIL/PL and PFH_d value), the maximum service life of the device is displayed.

Figure 5-7 Properties of devices

5.1.4 Display of compatible safety-relevant devices

(1) On the right side of the Safety Evaluation configuration view is the display of all compatible safety-relevant devices from the TIA Selection Tool project for the selected safety area (based on the standard) and the selected safety function. The icons on the right side of the device name indicate the type of safety-relevant device (sensor ⊡, evaluation unit ⊡, actuator ▇). Devices already in use in the safety function cause and effect chain are shown in gray.

(2) In addition, it is possible to select compatible devices via the filter function.

Figure 5-8 Display of compatible safety-relevant devices
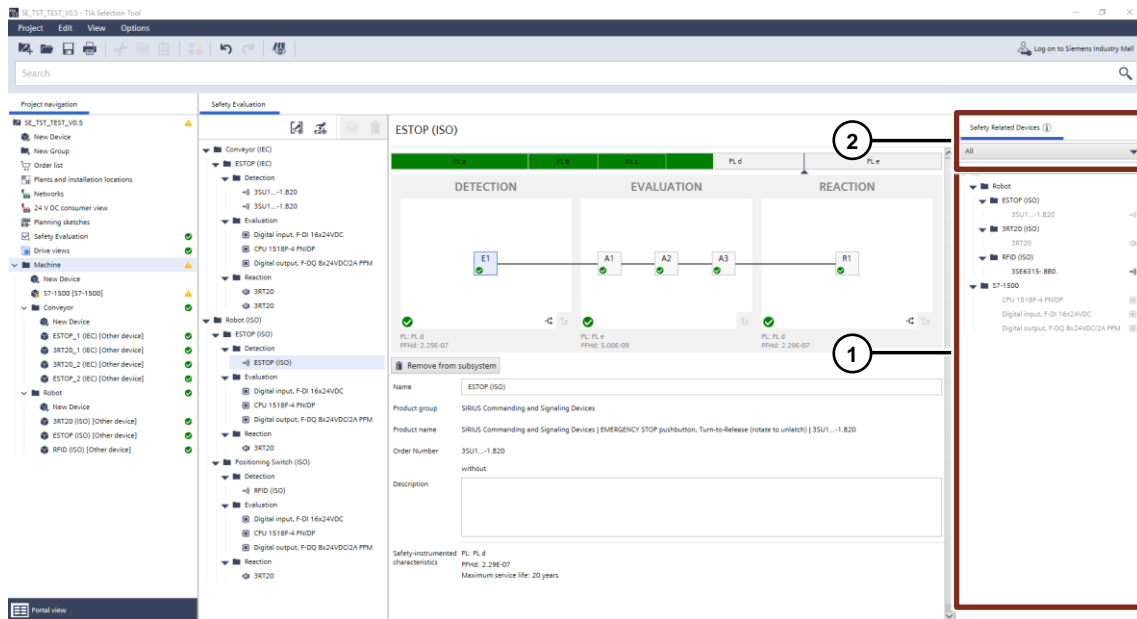
5.2   VDMA libraries

The calculation within the Safety Evaluation corresponds to the VDMA standard (standard sheet 66413), which basically offers the possibility to import data in XML format from other manufacturers into the Safety Evaluation of the TIA Selection Tool. The XML files of third-party manufacturers are not provided by Siemens, but can be imported directly with such files offered by the third-party manufacturers if the technical requirements are met. Siemens is therefore unable to check the completeness, correctness and timeliness of the data supplied by the third-party manufacturers. The possibility that individual items of information might be incorrect, incomplete, not up-to-date or not relevant for the user cannot therefore be ruled out. Siemens assume no liability for this. Once the XML files are imported, the Safety Evaluation only needs to evaluate the volume of data to determine whether the structure complies with the VDMA standard. However, it does not check whether the imported data is complete, correct, current and/or useful. When importing product data from third-party manufacturers, you need to observe manufacturer-specific instructions and your other elevated due diligence in the safety-relevant area. The following section describes in detail how such an import works in principle.

5.2.1 Importing third-party devices

Before importing data, the product data from the third-party manufacturer must be saved on a local drive (hard disk or network drive). The format of the file must be "*.xml" and the structure (XML file format) must comply with VDMA standard sheet 66413. The data can then be imported into the Safety Evaluation of the TIA Selection Tool. The library remains available even after closing the TIA Selection Tool and the XML file is preserved in this way. Third-party products already loaded from a characteristic value library also remain in the project file, provided the project is saved before closing.

Note	Note that the data stored on your drive is not automatically updated. Users are responsible for updating the imported data.

The data is imported into the Safety Evaluation with the menu command

1. "Project"
2. "Import"
3. "VDMA library".

Figure 5-9 Importing VDMA libraries
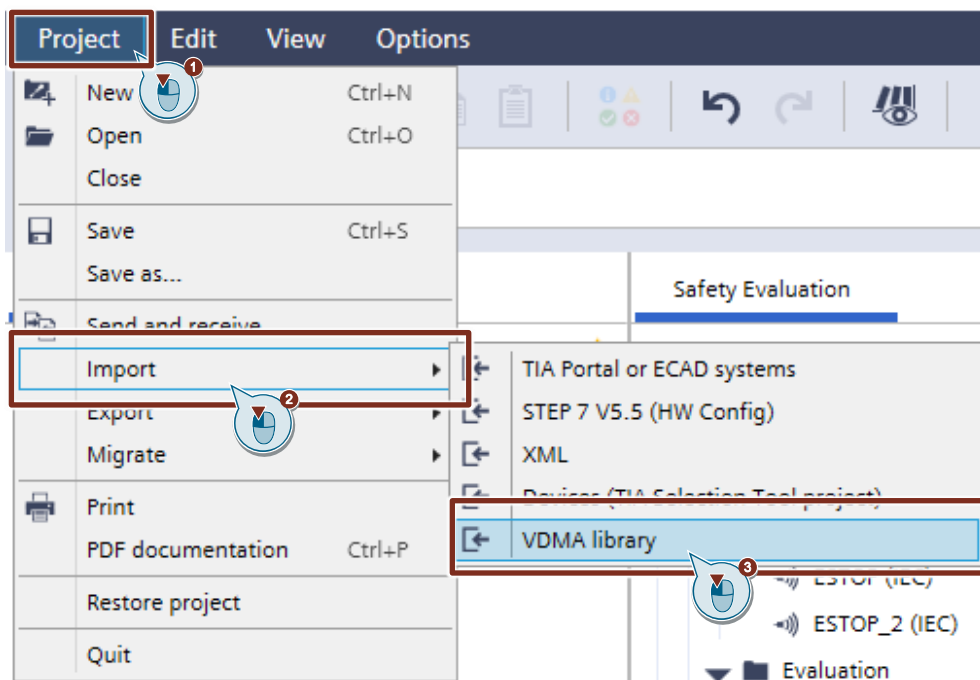
The user selects the storage directory of the XML characteristic value libraries to be imported and then confirms the selection of the characteristic value library with "Open". The data is imported, and the imported XML file is checked at the same time. If the check is successful, the import is performed without additional messages and the data is available to the user in Safety Evaluation for further processing. If the check is unsuccessful, a corresponding message appears:

Figure 5-10 Message on failed import of VDMA libraries
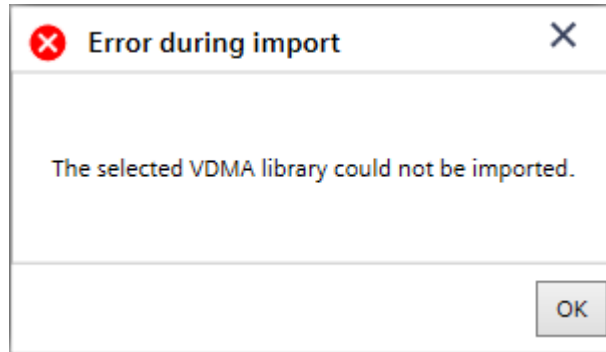
Note	The Siemens VDMA library cannot be imported because all Siemens device data are already contained in the TIA Selection Tool or the integrated VDMA library. This ensures that the safety characteristic values of Siemens devices are always up to date. You should therefore always ensure you are using the latest version of the TIA Selection Tool.

5.2.2 Siemens VDMA Library

SIEMENS – like other well-known manufacturers – also provides the characteristic values of its safety-related automation products in the form of a VDMA-compatible XML file for download. You can download the file at the following link:

VDMA 66413 neutral data interface (Entry ID: 109750403)

5.3   Creating and managing projects

Note	Loading, copying and deleting does not change the locally saved file. The local file (*.tia) is not overwritten with the current data until it is saved.

5.3.1   Loading existing projects

With "Project" → "Open", you can load projects already created from a *.tia file locally (e.g. from the hard disk of your PC or from a company internal server). These can then be further processed or used as the basis for new projects.

5.3.2   Creating a new project

A new project can be created with the button "Project" → "New". In the following sections, the individual screens of the Safety Evaluation and the required entries are presented step-by-step. If, depending on the selected standard, there are fundamental differences in the individual screens, these screens will be displayed one after the other.

5.3.3 Editing general project data

The Safety Evaluation of a project is the combination of one or more safety areas and safety functions of a plant or machine. The general project data can be edited according to the settings of the TIA Selection Tool.

Under "Project" → "Properties", enter the following information for the project:

1 —— Editor, plant type and notes
2 —— Name of the project
3 —— Contact information for the customer and editor
4 —— Change history

Figure 5-11 General project data
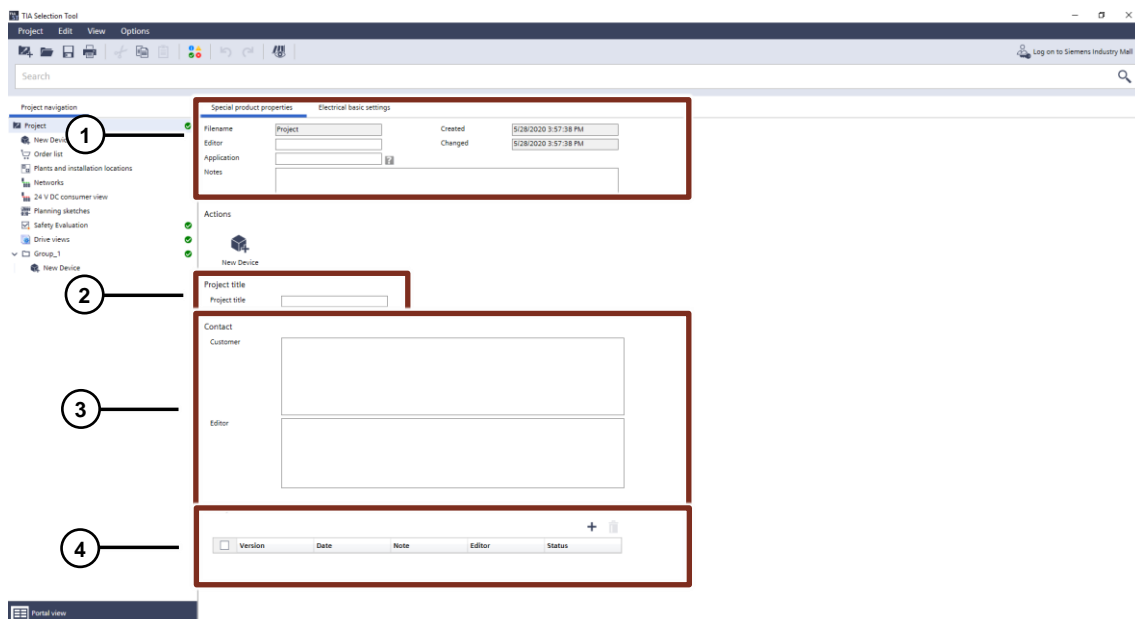
5.3.4 Creating and editing safety areas

A safety area is the grouping of several safety functions of a project or plant. At least one safety area is required. You can "structure" your machine with a safety area. This can help you to assign the safety functions to specific areas of your plant. In the Safety Evaluation, a safety area can be created by clicking the "New safety area" (⬚). After the button is pressed, the pop-up opens to edit the new safety area.

The following information about the safety area must be entered in the "New safety area" pop-up:

(1) ——— Name of the safety area

(2) ——— Selection of the standard to be applied

(3) ——— Description of the safety area

(4) ——— The desired safety area can be created with the given settings by pressing the "Create" button.

Once the safety area has been successfully created, it appears in the Management view of the Safety Evaluation.

Figure 5-12 Creating safety areas

5.3.5 Creating and defining new safety functions

A safety function is the combination of the individual subsystems or SRP/CS under "Detection", "Evaluation" and "Reaction". Safety functions can be added to the respective selected safety area by clicking the "New function" button (🏭). A pop-up also allows you here to enter all the basic properties of the new safety function.

The pop-up offers the possibility to display and define the following properties of the safety function:

① Name of the safety function

② Structure of the safety function

③ Required safety level SIL/PL (for information on how to determine this, see 5.3.6)

④ Associated safety area

⑤ Description of the safety function

⑥ Use the "Create" button to create the desired safety function with the specified settings.

Figure 5-13 Creating a safety function

5.3.6 Safety integrity considerations

As already mentioned in section 5.3.5, the required safety level (SIL/PLr) must be defined for each safety function. The required safety level can therefore be defined in the properties in the configuration area when creating a new safety function (see 5.3.5) or when editing an existing safety function (Figure 5-6). The following determination options are available for the two standards, IEC 62061 and ISO 13849.

IEC 62061

Select the required SIL according to the performed risk assessment or determine the required SIL after pressing the "Determine" button.

Figure 5-14 Determining the required SIL

ISO 13849-1

Select the required PL according to the risk assessment performed or determine the required PL after pressing the "Determine" button.

Figure 5-15 Determining the required PL

5.3.7 Creating and managing devices

Devices from the TIA Selection Tool

Note	Unfortunately, not all devices from the TIA Selection Tool are suitable yet for a Safety Evaluation. In this case, please add the device from the Siemens VDMA characteristic value library and use it in the Safety Evaluation. See section 5.3.7 Devices from a VDMA characteristic value library.

1 —— New devices can be added as usual in the TIA Selection Tool via the "New Device" button.

Figure 5-16 Creating a new device
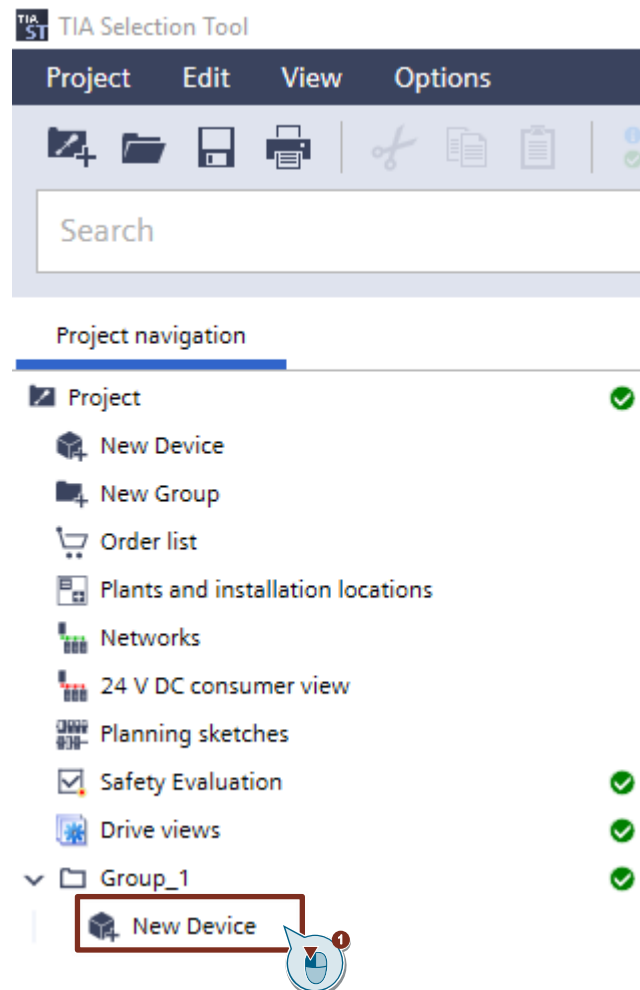
The resulting pop-up enables easy selection of the desired device based on the product families.

Figure 5-17 Selecting a new device

<table>
<tr><td>Plant configuration</td><td>Industry solutions</td><td>Library</td></tr>
<tr><td>Controllers</td><td>IO systems</td><td>Panels</td></tr>
<tr><td>Industrial PCs</td><td>Drive technology</td><td>Industrial controls</td></tr>
<tr><td>Software</td><td>Industrial Communication</td><td>Connection system</td></tr>
<tr><td>Power supply</td><td>SIMATIC Ident</td><td>Energy distribution and measurement</td></tr>
<tr><td>Internet of Things</td><td>Condition Monitoring Systems</td><td>Other devices</td></tr>
<tr><td>Safety Evaluation</td><td></td><td></td></tr>
</table>
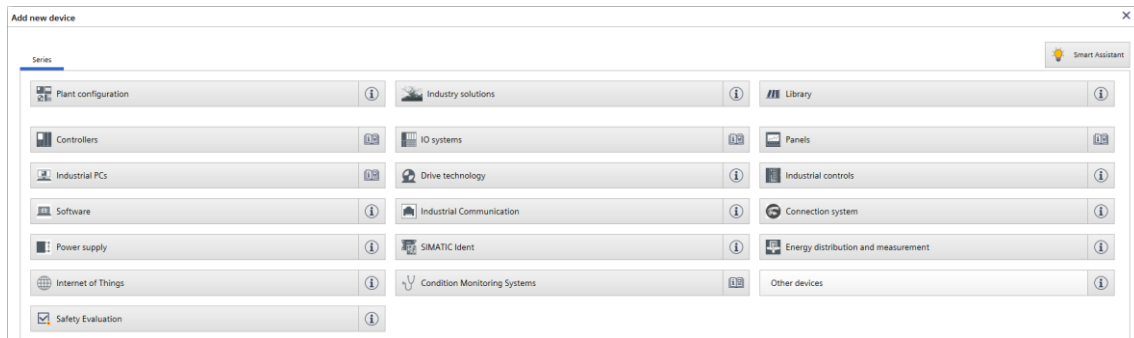
Note	When selecting the devices, ensure that they are safety-relevant components, since only such devices can be used in the Safety Evaluation. The selection "Failsafe Application" is therefore required for some products.

Devices from a VDMA characteristic value library

1   Another way of adding devices is to select the components via a VDMA characteristic value library (see also 5.2 VDMA libraries). These can be found in the pop-up under "Other devices".

Figure 5-18 Selecting another device
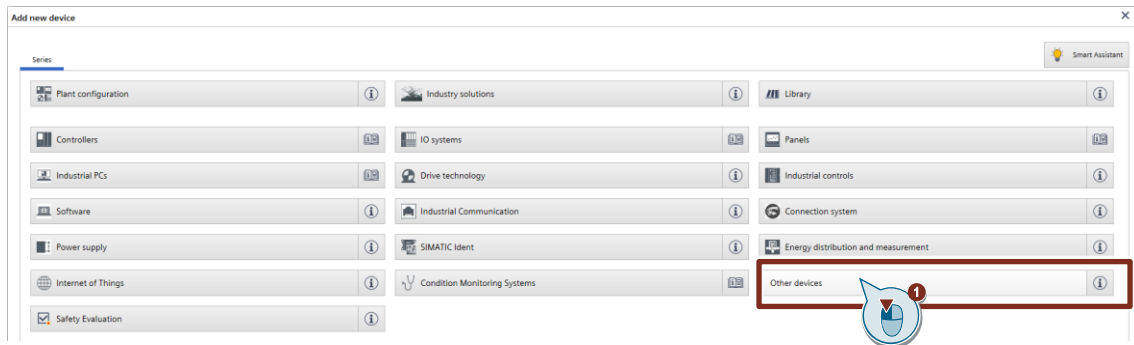
2   After the button is pressed, all VDMA characteristic value libraries already imported are listed according to the Siemens VDMA Library integrated by default (see also 5.2.1 Importing third-party devices). To select a device, select the desired VDMA library.

Figure 5-19 Selecting a VDMA characteristic value library

3 — After the VDMA library is opened, the available devices can be selected according to the "Detection", "Evaluation" and "Reaction" subsystems.

4 — The filter function allows you to select the device by product group.

5 — Alternatively, it is also possible to search directly for product names, product families or article numbers via the text box.

Figure 5-20 Selecting another device from a VDMA characteristic value library
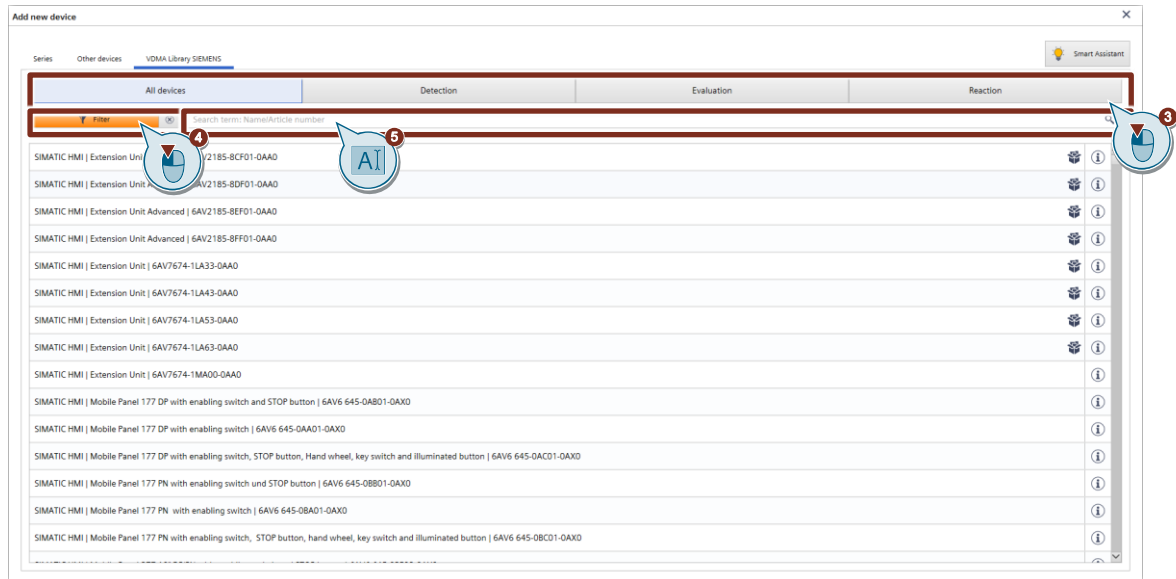
After the desired device is selected from the VDMA library, you still need to enter some safety-related values of the device (for more on this, see 5.3.8).

Defining your own devices

1 Alternatively, you can also define additional devices yourself using the safety-related characteristic values. The button for this can also be found in the pop-up under "Other devices" → "Other device".

Figure 5-21 Selection for definition of your own device

2 The as yet undefined device appears in the project navigation of the Safety Evaluation Tool. After the device is selected, the safety characteristic values can be added.

3 All device-specific settings can be made in the "Configure" tab.

4 The "Add Safety Values" button opens a pop-up for entering the parameters.

Figure 5-22 Adding safety values to your own devices
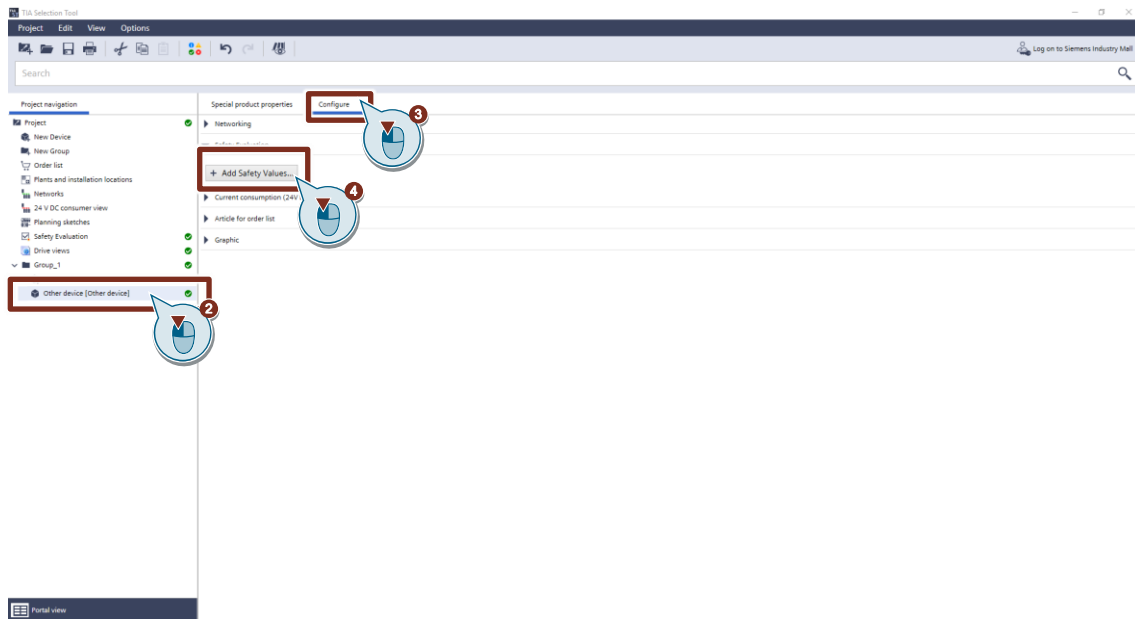
Entering the safety characteristic values is described in section 5.3.8 (Editing safety characteristic values).

5.3.8   Editing safety characteristic values

The screen for entering the safety characteristic values requires the following information:

(1) Standard to be applied (IEC 62061/ISO 13849)

(2) Subsystem (Detection/Evaluation/Reaction)

(3) Calculation of failure rate / safety level
($B10_{(d)}$, $MTTF_{(d)}$, MTBF, λ_d, SIL, PL)

(4) Architecture/Category
(1-channel / 2-channel or B, 1, 2, 3, 4)

(5) Order number

(6) Description

(7) Value for calculating failure rate / safety level
($B10_{(d)}$, $MTTF_{(d)}$, MTBF, λ_d, SIL, PL, PFH_d)

(8) Ratio of dangerous failures [%]
(for B10, MTTF and MTBF)

(9) Number of operations / test interval
(switching cycles) [n_{op}]

(10) Max. service life [T_1]

(11) Diagnostic coverage (DC) [%]

(12) CCF factor [%] / CCF points [0-100]
(for 2-channel architecture/category)

(13) Architectural constraints
(for detection according to IEC 62061)

$MTTF_d$ value and safe state of the test channel
(when reacting according to ISO 13849)

(14) Result:
- Wear-related service life $T10_d$
- Operation cycles $B10_d$
- Mean time to dangerous failure $MTTF_d$ (according to ISO 13849)
- Failure rate λ_d (according to IEC 62061)
- Probability of failure PFH_d
- Achieved safety level SIL/PL

(15) "Create"

Add Safety Values

Standard: IEC 62061

Subsystem: Detection

Calculation faultrate / Safety Level: B10

Component architecture: 2 Channel

Order Number

Description

B10 [operation cycles]: 1

Ratio of dangerous failures [%]: 1

Number of operations / test intervall [switching cycles]: 1   per hour

Max. service life, T1 [years]: 1

DC [%]: 0   Estimate DC...

CCF-Factor [%]: 1   Estimate CCF...

Architectural constraints: Yes

Wear-related service life, T10d (years)   0.01

B10d [operation cycles]   1.00E+02

λd [1/hours]   1.00E-03

PFHd

SIL   None

SIL CL   SIL 1

Create

5.3.9 Adding devices to subsystems of a safety function with 1 channel

1 — Once all devices required for the safety function have been added to the TIA Selection Tool project as described in section 5.3.7, they appear in the display of compatible safety-relevant devices (see 5.1.4).

2 — If a device is now to be added to one of the three subsystems of the safety function (Detection, Evaluation and Reaction), it must be selected in the display of compatible safety-relevant devices (see 5.1.4). Devices or components incompatible with the subsystem that are already in a subsystem are grayed out and cannot be selected.

3 — Click the "Add" button (🔼) to add the desired component to the corresponding subsystem of the safety function. The component then appears in the configuration area and in the management area of the safety function (see 5.1.3).

Note You can only add components that are compatible with the subsystems (Sensors → Detection, Controllers → Evaluation, Actuators → Reaction). If there is an incompatibility or devices already in use, the "Add" button is grayed out and cannot be pressed.

Figure 5-23 Adding devices to subsystems of a safety function with 1 channel
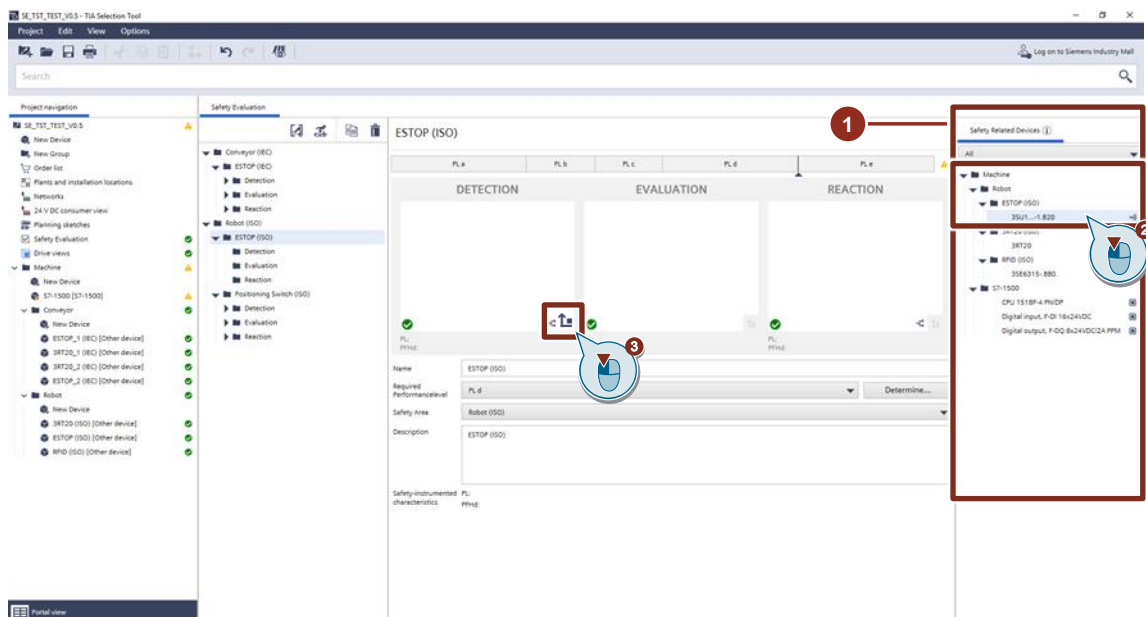
### 5.3.10 Adding devices to subsystems of a safety function with 2 channels

1 — Two-channel subsystem elements are only permitted in the subsystems "Detection" and "Reaction". Before you can add the devices into one of the two subsystems, these must be created according to section 5.3.7 and a 2-channel subsystem element must be added to the desired subsystem. You add this element by clicking the "Add 2-channel subsystem element" (⤴) button.

2 — After clicking the button, a 2-channel structure appears in the display of the corresponding subsystem in which you can now create the desired devices.

3 — As in section **Fehler! Verweisquelle konnte nicht gefunden werden.**, you can find the devices that can be added to the 2-channel subsystem element in the display of the compatible safety-related devices.

4 — You can now select the device that you want to add to the subsystem in the right selection column if it is not yet present in one of the three subsystems and is compatible with the corresponding subsystem. The modules with predefined SIL/PL are excluded from this.

5 — Click the "Add" (⤴) button in one of the two paths of the 2-channel subsystem element to add the desired component. The component will then appear in the configuration area and in the management area of the safety function (see 5.1.3). Repeat steps 3 to 5 for the second signal path of the subsystem structure.

Figure 5-24 Adding devices to subsystems of a safety function with 2 channels
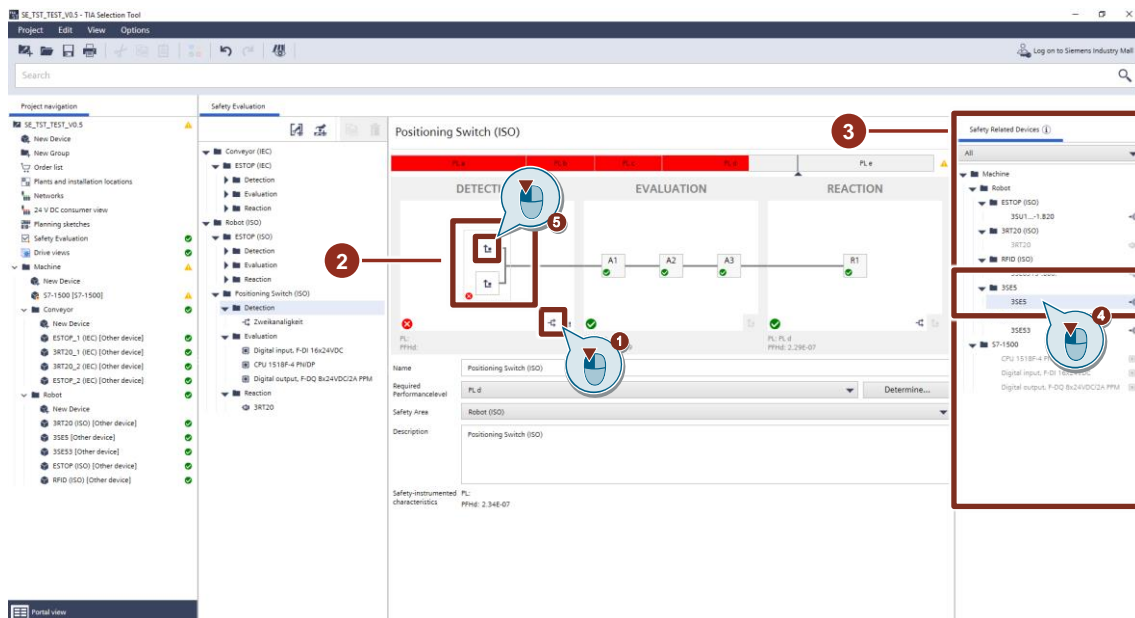
After adding both devices to the 2-channel subsystem, depending on the selected standard, a pop-up window opens for configuration of the 2-channel structure.

The screen for input of the safety values for the 2-channel subsystem element requires the following characteristic data according to ISO 13849:

1. Description

2. Category (3 or 4)

3. Diagnostics coverage (DC) [%] of the modules

4. CCF points [0-100]

5. Mean Time to Dangerous Failure (MTTF$_d$) of the modules

6. Result:
   - DC [%]
   - MTTF$_d$
   - Probability of failure PFH$_d$
   - Reached performance level (PL)

7. "Create".

Add Safety Values

1. Description

2. Circuit category — 3

3. DC Module 1 (%) — 90 — Estimate DC...
   DC Module 2 (%) — 90 — Estimate DC...

4. CCF [points] — ≥ 65 — Estimate CCF...

5. MTTFd1 (years) — 1369863
   MTTFd2 (years) — 136986

6. DC [%] 90
   MTTFd [years] 100
   PFHd 4.29E-08
   PL PL e

7. Create

The pop-up window for input according to IEC 62061 requires similar characteristic values:

1. Description

2. Max. service life (T1) of the modules [years]

3. Actuations/test intervals of the modules [switching cycles]

4. Diagnostics coverage (DC) [%] of the modules

5. CCF factor [%]

6. Architectural constraints (during Detection)

7. Failure rates λ_d of the modules

8. Result:
   - Failure rate λ_d
   - Probability of failure PFH$_d$
   - Reached safety integrity level (SIL)
   - SIL claim limit (SIL CL)

7. "Create".

Add Safety Values

1. Description

2. Max. Gebrauchsdauer, T1 Modul 1 [Jahre] — 20
   Max. Gebrauchsdauer, T1 Modul 2 [Jahre] — 20

3. Betätigungen/Testintervall Modul 1 [Schaltzyklen] — 365 — per year
   Betätigungen/Testintervall Modul 2 [Schaltzyklen] — 365 — per year

4. DC Modul 1 (%) — 90 — Estimate DC...
   DC Modul 2 (%) — 90 — Estimate DC...

5. CCF-Factor [%] — 1 — Estimate CCF...

6. Architectural constraints — Position Switch

7. λd1 [1/Stunden] — 8.333333E-09
   λd2 [1/Stunden] — 8.333333E-09

8. λd [1/hours] 8.45E-11
   PFHd 8.45E-11
   SIL SIL 2
   SIL CL SIL 2

7. Create

### 5.3.11 Examples of 2-channel devices and subsystem elements

For correct use of 2-channel subsystem elements, it is important to distinguish between two versions of this option. You can set up 2-channel systems using one module which has an internal 2-channel structure or two modules with any internal structure using the 2-channel subsystem element. The respective procedure for setting up a 2-channel system with one as well as with two devices in described in the examples below.

| Note	When creating a 2-channel system, the system components must be created and configured individually. Note that the selection of the category (ISO 13849-1) or the architecture (IEC 62061) relates to the individual device. It is identified with "Architecture of the component" and "Category of the component", respectively (see section 5.3.8). This selection affects how you reach the SIL or PL. To create a 2-channel system with two devices, always use the 2-channel subsystem element of the subsystems "Detection" and "Reaction".

Example 1: Two-channel emergency stop control device (one module)

1. Selection of a suitable device, e.g. "3SU1…-1H.20" from the SIEMENS VDMA library (see section 5.3.7)

2. Parameterization according to application – Category (3 or 4) or architecture of the component (2 channels), switching cycles/test intervals, diagnostics, etc. (see section 5.3.8)

3. **No** 2-channel subsystem element required, because the device already includes a 2-channel structure (see **Fehler! V erweisquelle konnte nicht gefunden werden.**)

   - Architecture of the component = 2 channels
     Category of the component = 3 or 4

   - Representation as one device with internal 2-channel structure
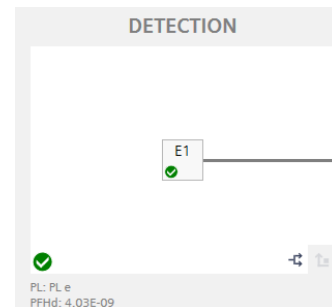
Example 2: Two different or identical position switches (two modules)

1. Selection of the devices, e.g. "3SE5…-..U.. " and "3SE5" from the SIEMENS VDMA library (see section 5.3.7)

2. Basic parameterization of the individual devices – category or architecture of the component (depending on device type), switching cycles/test intervals, diagnostics, etc. (see section 5.3.8)

3. Creation of a **2-channel subsystem element** in the subsystem "Detection", adding the components and completing the safety-instrumented parameters (see section 5.3.10)

   - Architecture and category of the circuit = "2 channels" or category "3" or "4"

   - Representation as 2-channel subsystem element consisting of the two position switches
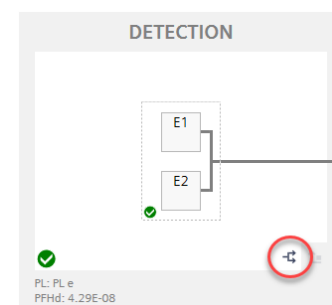
Example 3: Two different or identical contactors (two modules)

1. Selection of the devices, e.g. "3RT20" and "3RT10" from the SIEMENS VDMA library
2. Basic parameterization of the individual devices – category or architecture of the component switching cycles/test intervals, diagnostics, etc. (see section 5.3.8)
3. Creation of a **2-channel subsystem element** in the "Reaction" subsystem, adding the components and completing the safety-instrumented parameters (see section 5.3.10)

    - Architecture and category of the component depending on the device type
    - Architecture and category of the circuit = "2 channels" or category "3" or "4"
    - Representation as 2-channel subsystem element consisting of the two contactors
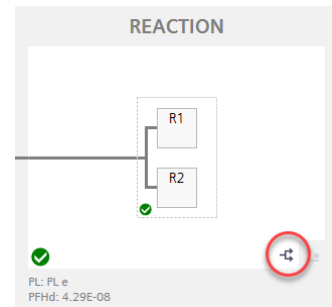
Note	It is possible for modules, such as contactors, to be treated as a 2-channel system by selecting the "category or architecture of the component" according to cat. 3/4 (ISO 13849-1) or 2-channel architecture (IEC 62061). However, this selection does not result in a 2-channel structure with two devices but makes this option available in one device.
	Adding the parameterized module as a single icon does not meet the requirements of a 2-channel structure with two devices, especially because only a single device is being added to the order list. For correct handling, the function of the 2-channel subsystem element must be used.

5.3.12 Result

1 After all required components have been added to the subsystems of the safety function, the result of the Safety Evaluation can be read out (see 5.1.3). The display of the required and achieved safety level (SIL/PL) uses a bar and color highlighting to show whether the requirements for the safety function's safety level have been met (red / green).

2 The devices of the individual subsystems use a status icon to show whether the safety-related characteristic values meet the requirements of the safety function ( ). Components with insufficient component quality therefore indicate a fault in the subsystem device ( ).

3 For the partial results of the individual subsystems, the safety level (SIL/PL) achieved for the subsystem and the PFH_D value achieved are displayed in addition to the status icon (/).

4 The overall result of the Safety Evaluation for the selected safety function is displayed in the properties in the configuration area.

5 If all safety functions of the Safety Evaluation meet their requirements for the required safety level, the corresponding status icon (/) also appears in the "Safety Evaluation" tab of the project navigation.
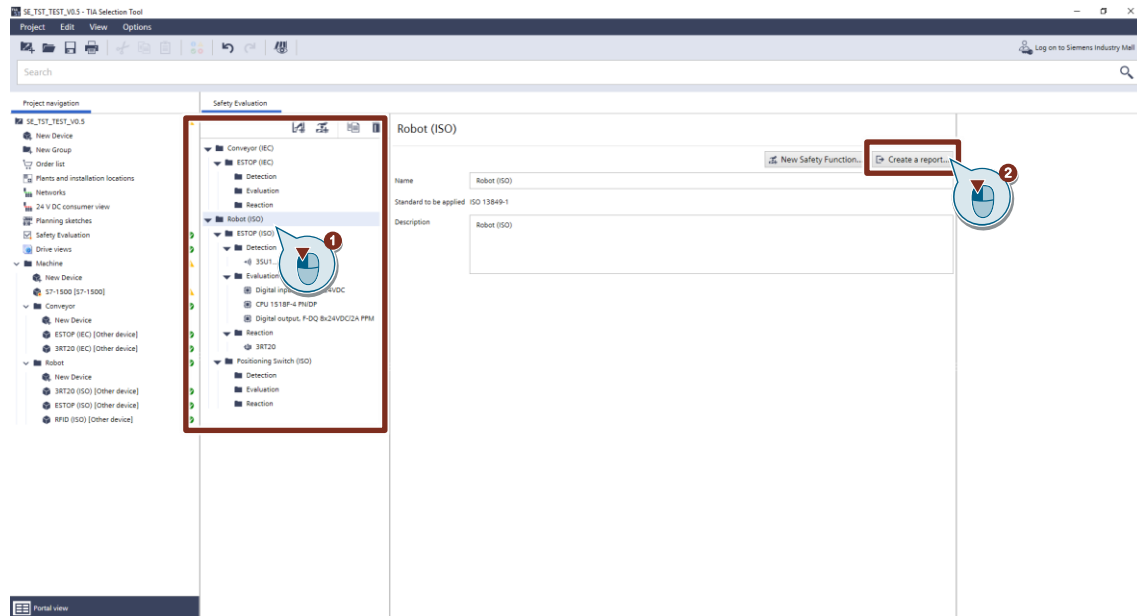
Figure 5-25 Result of the Safety Evaluation
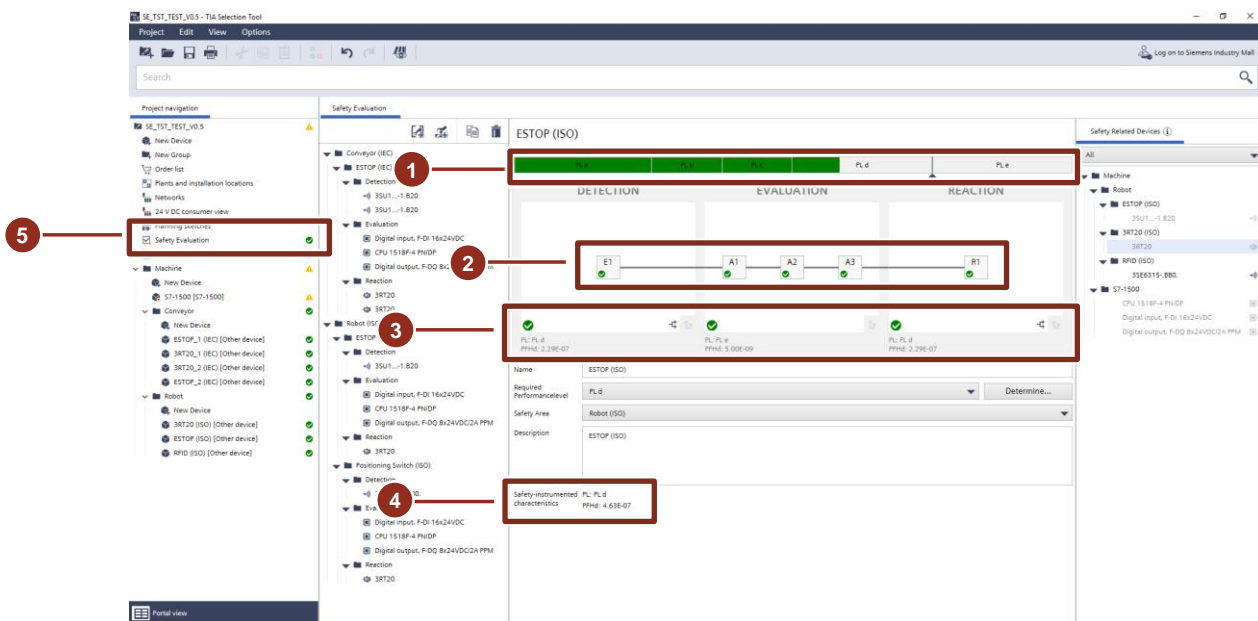
5.3.13 Creating a report

1 ——— To create the results report, select one of the safety areas created in the management area.

2 ——— Then click the "Create a report" button.

Figure 5-26 Creating a report

3 — After you press the "Create a report" button, a pop-up opens for selecting the safety areas and functions to be documented in the report. Use the check boxes to select which elements of the Safety Evaluation should be included in the results report.

4 — Then enter the names of the persons responsible for the project for "Author", "Project manager" and "Project reviewer" in accordance with the requirements for the duty of proof from IEC 62061 and ISO 13849.

5 — Please confirm the disclaimer again by checking the box. This can be viewed again by clicking the "Display disclaimer" button.

6 — Finally, the button "Create a report" can be used to output the results report of the Safety Evaluation.

Note A report can only be generated if the project participants are fully specified and the disclaimer is confirmed.

Figure 5-27 Creating a pop-up report
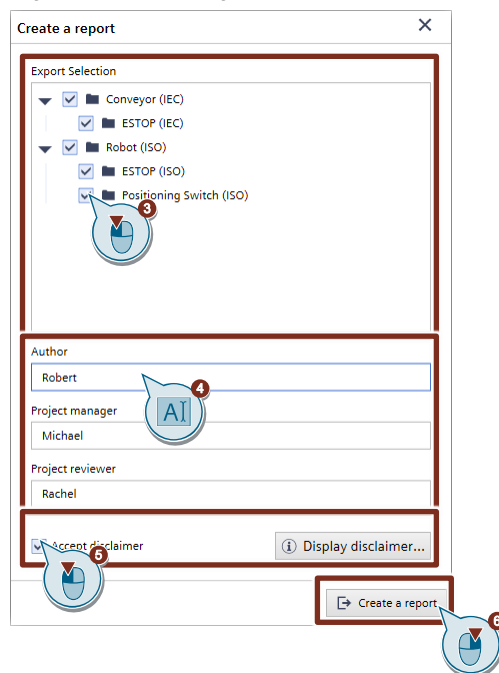
After selecting the path for saving, the report is stored in the target directory as a PDF document.

Figure 5-28 Safety Evaluation report in the TIA Selection Tool

The signed results report is attached to the proof of technical documentation.

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:
https://support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:
www.siemens.com/industry/supportrequest.

Service offer

Our range of services includes the following:

- Plant data services

- Spare parts services

- Repair services

- On-site and maintenance services

- Retrofitting and modernization services

- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:
https://support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:
https://support.industry.siemens.com/cs/ww/en/sc/2067

6.2 Links and Literature

Table 6-1 Links and Literature

No.	Subject
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the entry page of the manual https://support.industry.siemens.com/cs/ww/en/view/
\3\	Safety Evaluation in the TIA Selection Tool https://www.siemens.com/safety-evaluation
\4\	Siemens VDMA Library https://support.industry.siemens.com/cs/document/109750403
\5\	Functional Safety of Machines and Systems Order No.: A19100-L531-B123 (available for order from your SIEMENS representative)

6.3 Change documentation

Table 6-2 Change documentation

Version	Date	Change
V1.0	06/2020	First version
V1.1	09/2020	2-channel subsystem elements