

# Safety Evaluation Tool - SET

Getting Started · 06/2011

## Safety Integrated

Answers for industry.

**SIEMENS**

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# 1 General

## 1.1 Warranty, Liability and Support

The Safety Evaluation Tool is provided to you free of charge. Therefore, no warranty is granted for the present report with the exception of willful or fraudulent behavior. This particularly applies to the tool's correctness, freedom from errors, completeness and usability.

Use of the Safety Evaluation Tools is voluntary and subject to your own risk. As far as Siemens provides technical support with the tool's use or with report generation, such support is granted on a voluntary basis and without acknowledgement of any statutory duty.

With the exception of personal injury, the liability of Siemens and its vicarious agents is generally limited to cases of intent and gross negligence and to the extent of foreseeable and typical damage.

## 1.2 Description of the Functionality

The SIEMENS Safety Evaluation Tool provides valuable support with the rapid and easy assessment of safety functions in machines and systems.

The TÜV-tested online tool offers step-by-step user guidance, from specification of the safety system's structure, to component selection, down to the determination of the attained safety integrity in accordance with ISO 13849-1 and IEC 62061. This is also supported by the comprehensive integrated libraries.

As a result, the user is provided with a standard-compliant report, which can be integrated in the documentation as safety proof.

Online access to the Safety Evaluation Tool ensures that the calculations are always carried out on the basis of the currently applicable standards and the continuously updated technical data of all safety-relevant components by SIEMENS.

## 1.3 Prerequisites


A previously conducted risk analysis which defines the required safety functions forms a prerequisite for the Safety Evaluation Tool's application. Here, generally the logical functions with the already envisaged hardware sub-functions (e.g. detection, evaluation and reaction) are to be selected.

Furthermore, the persons in charge (project manager and project inspector) of the final acceptance tests have to be named.

## 1.4 Important Notes

The Safety Evaluation Tool is an online tool. All created projects are only saved locally on your PC. The project data are not saved on the Siemens online server.

If no entries are made for a period exceeding 30 minutes, the online connection will be interrupted after display of a respective note. In this case, any unsaved projects / changes will be deleted.

Therefore, please regularly save your project data via **File > Save projects** or by clicking the  Unsaved changes field.

## 2 Call-Up of the Safety Evaluation Tool

### 2.1 Link to the Safety Evaluation Tool

[www.siemens.com/safety-evaluation-tool](http://www.siemens.com/safety-evaluation-tool)

### 2.2 Registration

Registration data form Safety Evaluation Tool	
Login *	<input type="text"/> <small>The characters : " and \ are not allowed.</small>
First Name *	<input type="text"/>
Surname *	<input type="text"/>
Company *	<input type="text"/>
Street *	<input type="text"/>
Postal Code *	<input type="text"/>
Town *	<input type="text"/>
Country *	<input type="text" value="-----"/> ▼
e-Mail *	<input type="text"/>
Telephone *	<input type="text"/> <small>e.g. +44 (161) 446 6400</small>
<input type="button" value="Save"/>	

Upon first call-up of the Safety Evaluation Tool, you are requested to register yourself.

Please fill in the registration mask completely (\* = mandatory field). Please observe that these entries appear in the Safety Evaluation Tool and in the report under **Last editor**.

Following registration, you will receive an e-mail containing your access data (login name and password) for further use of the Safety Evaluation Tool.

The subsequent first-time registration process comprises some questions which are aimed at better matching our products to your needs in the future.

Of course, the Safety Evaluation Tool's use is free of charge.

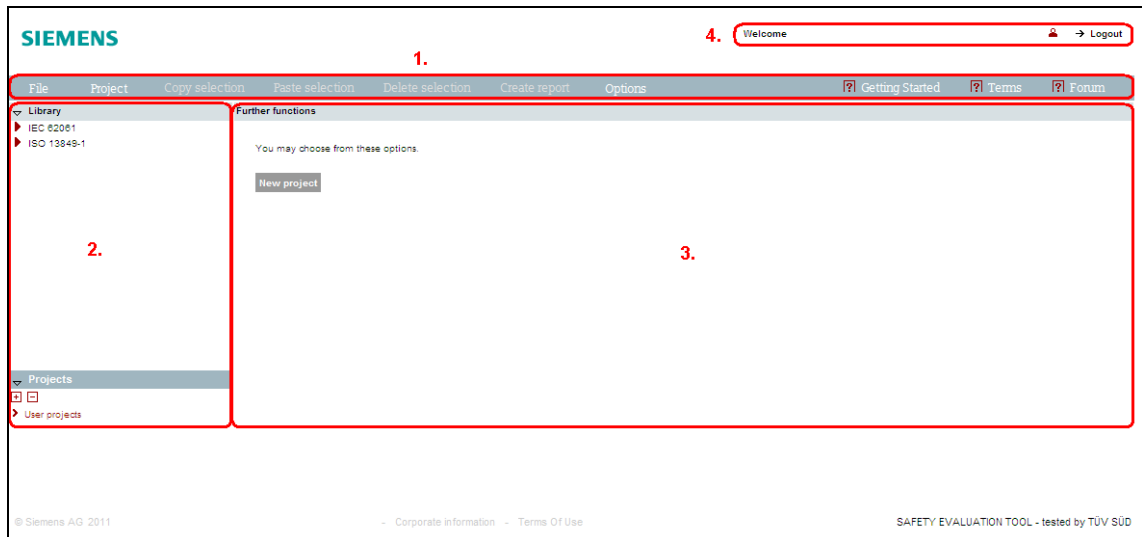
## 3 Operation of the Safety Evaluation Tool

The sections below describe the general functional principle of the Safety Evaluation Tool on the basis of an example.

### 3.1 Font Sizes of Masks

The font sizes of the masks can be changed in the Internet Explorer via **View > Zoom** or **Text size**.

### 3.2 Layout of Masks



The masks of the Safety Evaluation Tool are divided into four general sections:









#### 1. General buttons:

- **File** Pull-down menu with the following sub-items:
  - **New workspace:** Deletes the entire workspace under **User projects**
  - **Load projects:** Loads and opens a locally saved project under **User projects**
  - **Import project:** Loads and adds a further project to the currently open project (under **User projects**)
  - **Save projects:** Locally saves the open project or several projects under **User projects** to a file (\*.set); alternatively, the project can also be saved by clicking the  Unsaved changes field
- **Project** Pull-down menu with the following sub-items:
  - Creation of **New IEC 62061 project**
  - Creation of **New ISO 13849-1 project**
  - Creation of **New safety area**
  - Creation of **New safety function**
  - Creation of **New subsystem or SRP/CS**
  - **Export project**
- **Copy selection:** Copies the selected component (tree node under **Library** or **User projects**) to the cache
- **Paste selection:** Pastes the component from the cache (tree node under **User projects**)



- **Delete selection:** Deletes the selected component (tree node under **User projects**)
- **Create report:** The result report of the currently selected project is created via this button
- **Options:** Activates or de-activates the display of the product actuality in the project tree
- **Getting Started:** Link to this document
- **Terms:** Link to the reference "Safety Integrated, Terms and Standards" with terms and background information on the relevant standards
- **Forum:** Link to the "Safety Evaluation Tool" online forum for questions, suggestions and additional information

**2.** Navigation tree for **Library** (example projects pre-defined by SIEMENS) and **Projects** (customer projects)

The symbols in the navigation tree have the following meaning:

-  By clicking this symbol, all elements and their sub-levels are displayed
-  By clicking this symbol, all elements and their sub-levels are minimized
-  Further elements are available under the element, which are displayed by clicking the arrow
-  The elements available under the element are displayed; they can be minimized by clicking the arrow
-  Lowermost level of the project
-  Required entries are missing under the tree node
-  The function does not meet the required SIL or PL
-  Product update information is available (e.g. product can no longer be ordered). For more details, select the corresponding product

**3.** Workspace in which all required entries are made

**4.** Section for display of the current login name; language selection of the Safety Evaluation Tools via the  symbol. User change via  Logout

## 3.3 Library

Typical example projects, which can be used as basis for your own projects, are available under **Library**.

### 3.3.1 Inserting Safety Functions from Libraries

To insert a safety function from a library in **User projects**, proceed as follows:

- Select the exemplary safety function in accordance with the respectively applicable standard in **Library**
- Operate the **Copy selection** button
- Create a new project under **User projects** or select an existing project
- Create a new safety area in this project or select an existing safety area
- Select this safety area
- Operate the **Paste selection** button

### 3.3.2 Inserting Sub-Systems or SRP/CS from Libraries

Besides complete safety functions, also only individual sub-systems or SRP/CS can be inserted in **User projects** from a **Library**. The procedure is as follows:

- Select the exemplary sub-system or SRP/CS in accordance with the applicable standard in **Library**
- Operate the **Copy selection** button
- Create a new project under **User projects** or select an existing project
- Create a new safety area in this project or select an existing safety area
- Create a new safety function in this safety area or select an existing safety function
- Select the respective level (DETECTION, EVALUATION or REACTION)
- Operate the **Paste selection** button
- Delete the sub-system or SRP/CS, which was automatically inserted and may no longer be required after copying, in **User projects**

## 3.4 Creating User Projects

### Note

The locally saved file is not changed by loading, copying and deleting.  
The local file (\*.set) is only overwritten with the current data upon saving.

### 3.4.1 Loading Existing Projects

Already created projects can be loaded locally from a \*.set file (e.g. from your PC's hard disk or a company-internal server) via **File > Load projects**. These projects can be subsequently further edited or used as basis for new projects.

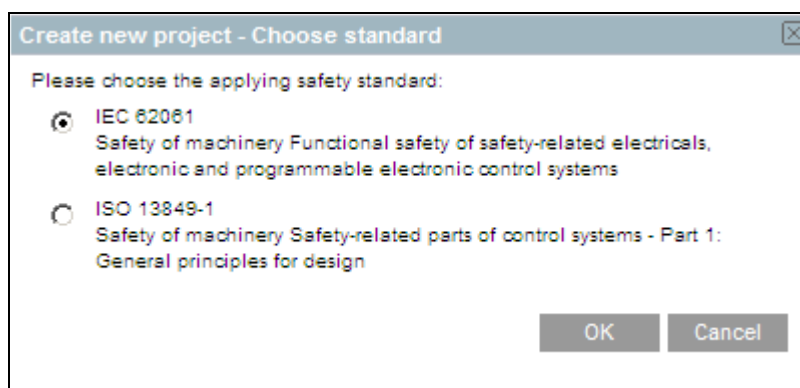
### 3.4.2 Adding an Existing Safety Area / Function

To add a safety area or a safety function from a previously created project to an open project, proceed as follows:

- Operate **Load > Import project** and select the respective project with the desired safety area or the desired safety function
- After insertion of the project, select the desired safety area or safety function via **Copy selection**
- Insert the safety area or safety function in your project via **Paste selection**
- The project no longer required can be subsequently deleted via **Delete selection**

### 3.4.3 Creating a New Project

To create a new project, select **User Projects** and operate the **New project** button. Select the applicable standard for this project in the automatically opened dialog.



IEC 62061 is used for this example.

The next chapters feature a step-by-step description of the Safety Evaluation Tool's individual masks and the required entries. Masks which differ due to general differences in the standards are illustrated consecutively.

### 3.4.4 Project - General Description Editing

➔ The term project refers to the summarization of one or several safety areas and safety functions of a system or machine.

The screenshot shows the Siemens Safety Evaluation Tool interface. At the top, there is a navigation bar with the Siemens logo, 'Unsaved changes', 'Welcome', and a 'Logout' button. Below this is a menu bar with options: File, Project, Copy selection, Paste selection, Delete selection, Create report, Options, Getting Started, Terms, and Forum. The main content area is titled 'Project - General description' and contains a form with the following fields:

Name	Company XY
Safety standard	EC 62061
Manager	Bill Smith
Inspector	John Smith
Systemtype	Conveyor
Document risk analysis	Hazard_analyse.doc
Description	

Below the form, there is a section titled 'Further functions' with the text 'You may choose from these options.' and a button labeled 'New safety area' which is highlighted with a red box.

At the bottom of the interface, there is a footer with the text: © Siemens AG 2011, Corporate information, Terms Of Use, and SAFETY EVALUATION TOOL - tested by TÜV SÜD.

The following information on the project has to be entered under *Project – General description*:

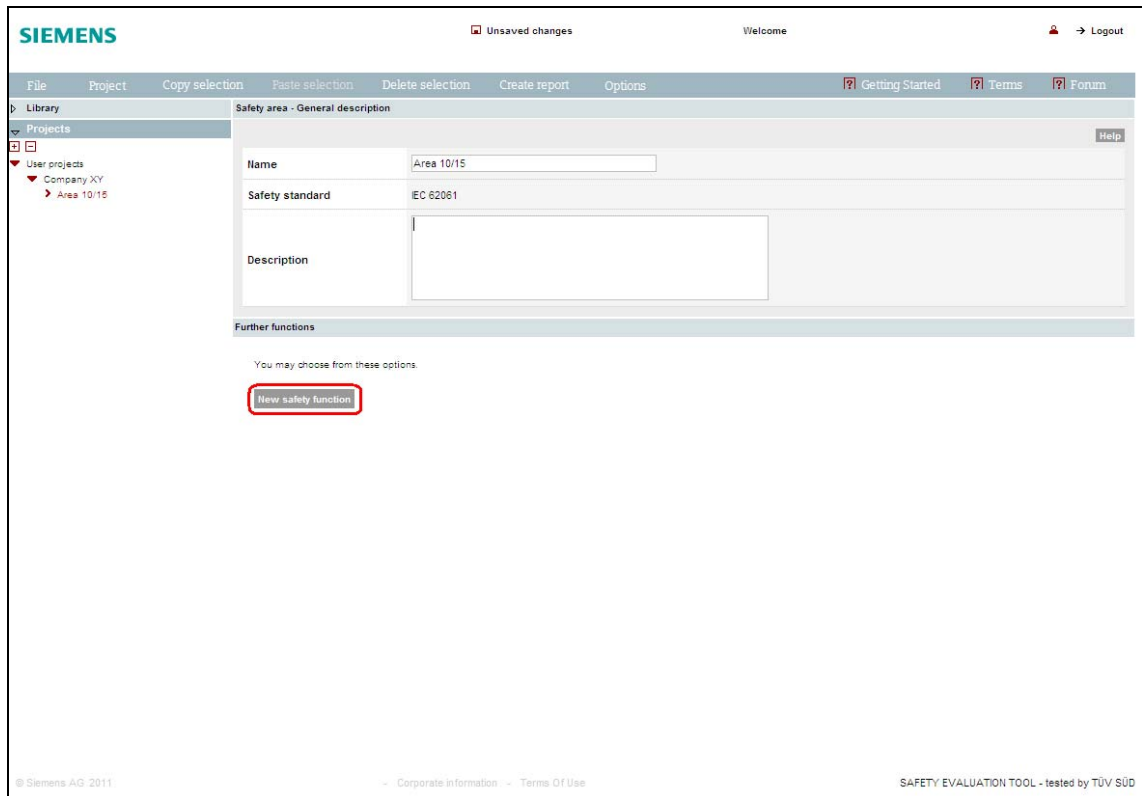
- **Name** of the project
- **Manager** for the project
- **Inspector** for the project
- **System type**
- Name of the **Document** for risk assessment
- **Description** of the project

Then, operate the **New safety area** button under **Further functions**.

### 3.4.5 Safety Area – General Description Editing

➔ The term safety area refers to a grouping of several safety functions of a project or system. At least one safety area is required.

A safety area helps to “structure” your machine in order to assign the safety functions to specific system sections.



The following information on the safety area has to be entered under *Safety area – General description*:

- **Name** of the safety area
- **Description** of the safety area

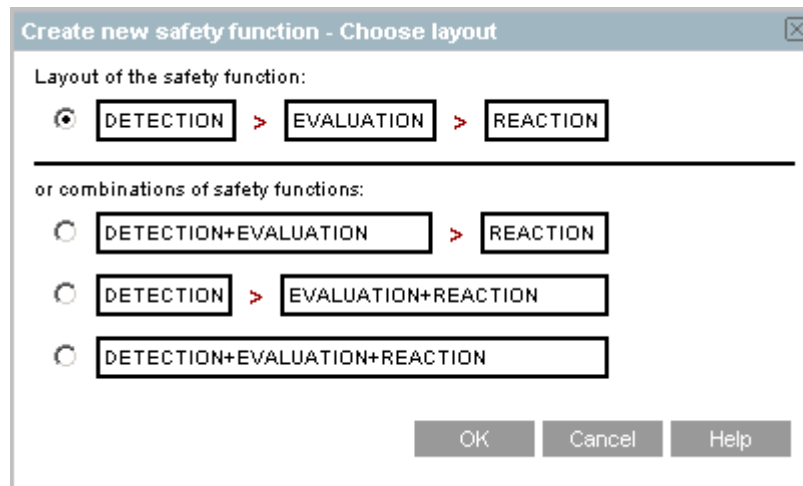
Then, operate the **New safety function** button under **Further functions**.

### 3.4.6 Creating a New Safety Function, Layout Definition

Prior to creating the safety function, the safety function's layout has to be defined.

To ease further entries, the combinations below are available in addition to the standard layout of **DETECTION** > **EVALUATION** > **REACTION** (consisting of three sub-systems or SRP/CS):

- **DETECTION+EVALUATION** > **REACTION** With this combination, the detection and evaluation sub-functions are summarized and only devices which combine these function are suggested to you (e.g. SIRIUS standstill monitor 3TK2810).
- **DETECTION** > **EVALUATION+REACTION** With this combination, the evaluation and reaction sub-functions are summarized and only devices which combine these functions are suggested to you (e.g. frequency converter SINAMICS G120).
- **DETECTION+EVALUATION+REACTION** With this combination, the three sub-functions are summarized and only devices which combine these functions are suggested to you (e.g. safety light curtain).



This Getting Started uses the standard layout

**DETECTION** > **EVALUATION** > **REACTION**. Confirm the selection via the **OK** button.

### 3.4.7 Safety Function – General Description Editing

➔ The term safety function refers to a summarization of the individual sub-systems or SRP/CS under DETECTION, EVALUATION and REACTION.

The screenshot displays the 'Safety function - General description' form in the Siemens Safety Evaluation Tool. The form contains the following fields and values:

Name	Emergency Stop	Status	open
Project name	Company XY	Version	1.0
Operation mode	Automatic	Creation date	June 10, 2011 8:30:59 AM GMT
Last editor		Last edit date	June 10, 2011 8:31:38 AM GMT
Inspector	Henry Smith		
Description			

A warning message is displayed: **The safety function consists of subsystems with missing data.**

Below the form, the 'Consideration of safety integrity acc. to IEC 62061' section shows 'Required SIL' set to 'SIL 2' and an 'Evaluate' button.

At the bottom, the text reads: 'To edit an existing subsystem please select the relevant functional area. To insert a new subsystem, please mark the particular functional area.'

The following information on the safety function has to be entered under *Safety function – General description*:

- **Name** of the safety function
- **Operation mode** valid for this safety function
- **Inspector** of the safety function
- **Description** of the safety function
- **Status** of the safety function's assessment
- **Version** of the safety function's assessment

#### Note

The **Last editor**, who is automatically assigned upon login (first name and surname), cannot be edited. .

With loaded projects, the **Last editor** is only overwritten by the currently registered user of the Safety Evaluation Tool when project changes are saved.

The safety function's safety integrity now has to be selected in accordance with the selected standard.

3.4.7.1 IEC 62061; Consideration of Safety Integrity:

Select the **Required SIL** in accordance with the implemented risk analysis or determine the required SIL by operating the **Find out** button.

Determination of the required SIL acc. to IEC 62061, annex A

**Determination of the required SIL**  
(by SIL assignment)

Frequency		Probability of hzd. event		Avoidance	
Fr		Pr		Av	
≥ 1 per hr	5	Very high	5		
< 1 per hr - ≥ 1 per day	5	Likely	4		
< 1 per day - ≥ 1 per 2wks	4	Possible	3	Impossible	5
< 1 per 2wks - ≥ 1 per yr	3	Rarely	2	Possible	3
< 1 per yr	2	Negligible	1	Likely	1

Consequences	Severity Se	Class Cl = Fr + Pr + Av				
		4	5 - 7	8 - 10	11 - 13	14 - 15
Death, loosing an eye or arm	4	SIL 2	SIL 2	SIL 2	SIL 3	SIL 3
Permanent, loosing fingers	3	Other measures		SIL 1	SIL 2	SIL 3
Reversible, medical attention	2	Other measures			SIL 1	SIL 2
Reversible, first aid	1	Other measures				SIL 1

Procedure

- Determination of damage severity Se
- Determination of points for frequency Fr probability of hzd. event Pr and avoidance Av
- Total of points Fr + Pr + Av = class Cl
- Interface line severity Se and column Cl = required SIL

Source: Functional Safety in Machines and Systems - Easy Implementation of the European Machinery Directive, Siemens AG 2008 (updated to apply to the Corrigendum 2)

Severity of the possible harm Se

Frequency and duration of exposure Fr

Probability of occurrence of a hazardous event Pr

Probability of avoiding or limiting the harm Av

Duration of stay less than 10 minutes

Class Cl (Fr+Pr+Av) pts.

Required SIL

OK Cancel

Then, select the **Sensor – group** in the navigation tree under **DETECTION**.

3.4.7.2 ISO 13849-1; Consideration of Safety Integrity:

Select the **Required PL** in accordance with the implemented risk analysis or determine the required PL by operating the **Find out** button.

Determination of the required PL acc. to ISO 13489-1, annex A

**Starting point for risk reduction estimation**

**Risk Parameter**

S = Severity of injury  
 S1 = Slight (normally reversible) injury.  
 S2 = Sever (normally irreversible) injury including death.

F = Frequency and/or exposure time to the hazard  
 F1 = Seldom up to often and/or the exposure time is short.  
 F2 = Frequent up to continuous and/or the exposure time is long.

P = Possibility of avoiding the hazard or limiting the harm  
 P1 = Possible under specific conditions.  
 P2 = Scarcely possible.

a,b,c,d,e = Estimates of safety-related performance level

Source: Functional Safety in Machines and Systems - Easy Implementation of the European Machinery Directive, Siemens AG 2008

Severity of injury S

Frequency and/or exposure time to hazard F

Possibility of avoiding the hazard or limiting the harm P

Required PL

Then, select the **Sensor – group** in the navigation tree under **DETECTION**.

### 3.4.8 Sensor Group (ES Pushbutton) Editing

In the *Sensor group* mask, the properties of the sensor (e.g. EMERGENCY-STOP commanding device) for activation of the safety function have to be defined.

The mask layout and values to be entered differ depending on the used standard.

The screenshot shows the Siemens Safety Evaluation Tool interface. The main window is titled 'Sensor group - IEC 62061 - General description'. The interface includes a menu bar with options like 'File', 'Project', 'Copy selection', 'Paste selection', 'Delete selection', 'Create report', 'Options', 'Getting Started', 'Terms', and 'Forum'. A project tree on the left shows a hierarchy: 'User projects' > 'Company XY' > 'Area 10/15' > 'Emergency Stop' > 'DETECTION' > 'Sensor group'. The main configuration area has the following fields and values:

- Name:** Sensor group
- Type:** Customerdata required (selected), SIL/PL exists
- Architecture:** 1 Channel
- Nr. of components:** 1
- Manufacturer:** Siemens
- Productgroup:** Please choose
- Producttype:** Please choose
- Integrated communication connection:** Please choose
- Order number:** Please choose
- More order numbers:** (empty field)
- Number of operations / test interval (switching cycles):** 1 Per hour

A warning message is displayed: 'Channel 1: no product selected.' Below the configuration area, there are sections for 'Consideration of safety integrity acc. to IEC 62061' and 'Consideration of safety integrity'.

The general presettings of the mask are as follows:

- **Name** of the sensor group
- **Type** of the sensor
  - **Customer data required** (wear component)
  - **SIL / PL exists** (electronic component)
- When selecting **Customer data required**, using the pull-down menu, **Architecture** of the sensor group (1 or 2-channel) must be selected.
- When selecting **Customer data required**, using the pull-down menu, the **No. of components** must be edited.
  - 1-channel architecture → 1 component
  - 2-channel architecture
    - 1 component (channels 1 and 2 are identical)
    - 2 components (identical or different types) with different values (e.g. different actuation cycle)
- **Manufacturer** of the sensor
  - When selecting **Siemens**, the appropriate Siemens sensors are recommended with the safety-relevant data.
  - When **Third-party manufacturer** is selected, the safety-relevant data of the sensor can be freely entered.
  - The two versions are subsequently explained in detail.

**Option 1: Manufacturer = Siemens**

The screenshot shows the Siemens Safety Evaluation Tool interface for configuring an ES Pushbutton sensor. The main configuration area includes the following fields and options:

- Name:** ES Pushbutton
- Comment:** S7 Connection
- Type:** Customerdata required (selected), SIL/PL exists
- Architecture:** 2 Channels
- Manufacturer:** Siemens
- Productgroup:** SIRIUS Commanding and Signaling Devices
- Producttype:** EMERGENCY STOP pushbutton, Turn-to-Release (rotate to unlatch)
- DC (%):** 99 (high) - **Estimate DC** button
- Architectural constraints:** Emergency Stop - **Estimate CCF** button
- CCF-Factor (%):** 10 - **Estimate CCF** button

The summary table at the bottom shows the following values:

Safety function	PFHD	SIL CL	PFHD
E-05	E-06	E-07	E-08

Complete all of the fields displayed below. Help when completing the fields is available using the tool tips for these fields and the **Help** button

- To determine the **DC** and the **CCF factor**, the corresponding selection screen forms are available (**Estimate DC** or **Estimate CCF** button)
- **S7 connection** (only for sensors without **integrated communication connection**), using this field, you can specify whether the sensor is connected to a fail-safe PLC via a fail-safe digital input module. When activated, under **EVALUATION**, a partial system and/or SRP/CS is created for the fail-safe digital input module.
- **Structural restriction** (only for IEC 62061):
  - The selection **Yes** or **Position switch** limits the SIL CL to 2
  - The selection **None** or **Emergency Stop** does not limit the SIL CL
  - Also see **Help**

Then, in the navigation tree, under **EVALUATION**, select **S7 – ES Pushbutton**.

## Option 2: Manufacturer = *Third-party manufacturer*

Complete all of the fields displayed below. Help when completing the fields is provided using the tool tips to the fields and the **Help** button. You can obtain the corresponding values from the component supplier.

- In the field next to ***Third-party manufacturer***, enter the manufacturer's name
- Under ***Fault rate calculator*** you can select which value should be used to calculate the fault rate. The fault rate can be calculated using:
  - B10
  - B10d
  - MTTF
  - MTTFd
  - MTBF
  - $\lambda D$
- To determine the ***DC*** and the ***CCF-Factor***, the corresponding selection screen forms are available (**Estimate DC** or **Estimate CCF** button)
- ***Structural restriction*** (only for IEC 62061):
  - The selection ***Yes*** or ***Position switch*** limits the SIL CL to 2
  - The selection ***None*** or ***Emergency Stop*** does not limit the SIL CL
  - Also see **Help**

Then, in the navigation tree under ***EVALUATION***, select ***Logic - group***.

### 3.4.9 Logic Group (S7 – ES Pushbutton) Editing

Due to selection of the **S7-Connection** in the *Sensor group*, a sub-system or SRP/CS was automatically created for the failsafe digital input module under **EVALUATION**.

The mask layout and values to be entered differ depending on the used standard.

The screenshot shows the Siemens Safety Evaluation Tool interface. The main configuration area is titled "Logic group - IEC 62061 - General description". It contains the following fields and values:

- Name:** S7 - ES Pushbutton
- Manufacturer:** Siemens
- Productgroup:** SIMATIC ET200M - fail-safe Modules
- Producttype:** SM326 F-DI/24
- Integrated communication connection:** #relevant
- Order number:** 6ES7326-1BK02-0AB0
- Channels:** 2 channels
- max. service life, T1 (in years):** 20

Below the configuration fields, there is a table for "Consideration of safety integrity acc. to IEC 62061":

Parameter	Value
SIL CL	SIL 3
PFHD	1.00 E-09

At the bottom, there is a "Consideration of safety integrity" section with a table for "Safety function":

Safety function	PFHD	E-05	E-06	E-07	E-08
	SIL 3	SIL 3	SIL 3	SIL 3	SIL 3

A "Help" button is highlighted with a red box in the top right corner of the configuration area.

Fill in all fields. Help is provided by the tool tips on the fields and via the **Help** button.

Then, select the **Logic – group** in the navigation tree under **EVALUATION**.

### 3.4.10 Logic Group (S7 – Controller) Editing

In the *Logic group* mask, the properties of the safety function's evaluation logic (e.g. safety relay, failsafe CPU) have to be defined.

The mask layout and values to be entered differ depending on the used standard.

The screenshot shows the Siemens Safety Evaluation Tool interface. The main window is titled "Logic group - IEC 62061 - General description". The interface includes a navigation tree on the left with categories like "Emergency Stop", "DETECTION", "EVALUATION", and "REACTION". The main form area contains the following fields and values:

Name	S7 - Controller	Comment	
Manufacturer	Siemens	Reference designations	
Productgroup	SIMATIC S7 F-CPU		
Producttype	CPU 315F 2R/DP		
Integrated communication connection	irrelevant		
Order number	8ES7315-2FJ14-0AB0	max. service life, T1 (in years)	20
More order numbers			

Below the form, there are sections for "Consideration of safety integrity acc. to IEC 62061" and "Consideration of safety integrity". The latter shows a bar chart for PFHD values across different safety functions (E-05 to E-08).

The general presettings of the mask are as follows:

- **Name** of the logic group
- **Manufacturer** of the evaluation logic
  - When Siemens is selected, the corresponding Siemens evaluation units are recommended with the safety-relevant data.
  - When **Third-party manufacturer** is selected, the safety-relevant data of the evaluation logic can be freely entered. Details on the **Third-party manufacturer** are provided in Chapter 3.4.8
  -
- Next, fill in all fields. Help is provided by the tool tips on the fields and via the **Help** button.

Then, select the **Actuator – group** in the navigation tree under **REACTION**.

### 3.4.11 Actuator Group (Drive) Editing

In the *Actuator group* mask, the properties of the safety function's actuator (e.g. line contactor, failsafe drive) have to be defined.

The mask layout and values to be entered differ depending on the used standard.

The screenshot shows the Siemens Safety Evaluation Tool interface for editing an Actuator Group (Drive). The interface includes a top navigation bar with 'File', 'Project', 'Copy selection', 'Paste selection', 'Delete selection', 'Create report', and 'Options'. A left sidebar shows a project tree with 'User projects', 'Company XY', and 'Area 10/15'. The main area displays the 'Actuator group - IEC 62061 - General description' form. The form has the following fields:

- Name:** Drive
- Type:** Radio buttons for 'Customerdata required' and 'SIL/PL exists'.
- Manufacturer:** Siemens
- Productgroup:** SINAMICS S110
- Producttype:** Please choose
- Integrated communication connection:** Please choose
- Order number:** Please choose
- More order numbers:** (empty text field)


A red box highlights a warning message: 'No product selected.' Below the form, there are sections for 'Consideration of safety integrity acc. to IEC 62061' and 'Consideration of safety integrity'.

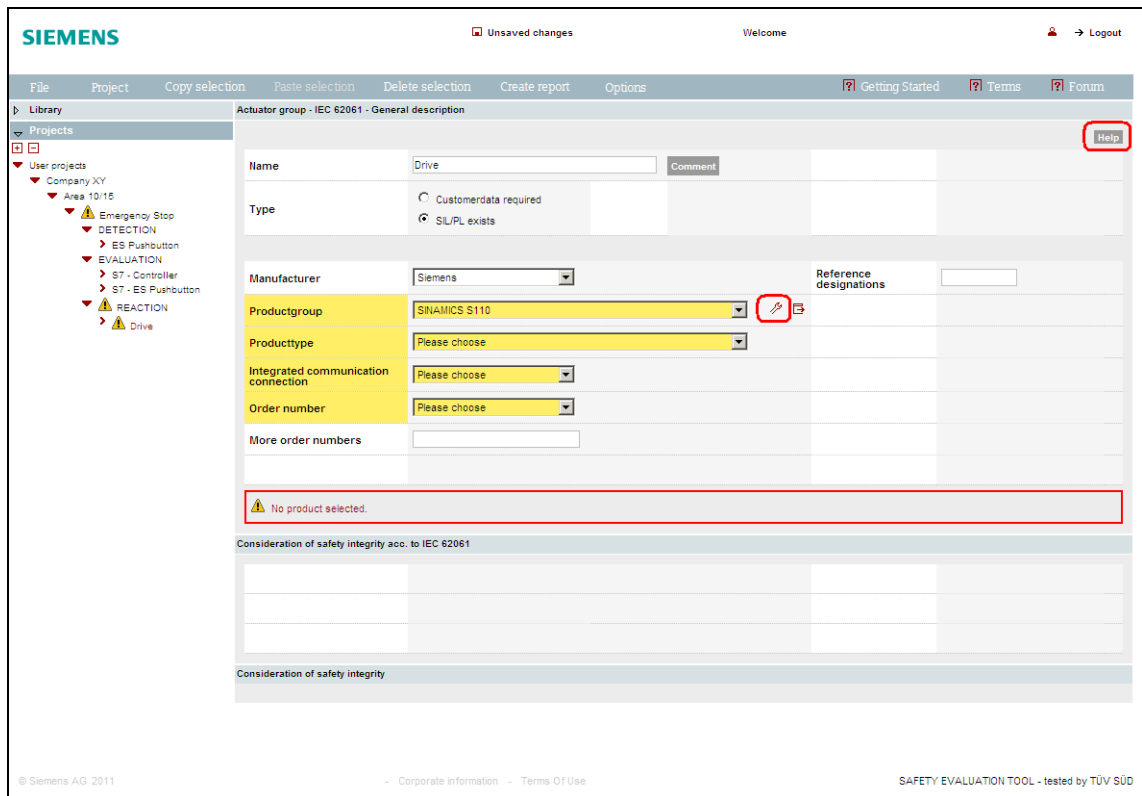
The general presettings of the mask are as follows:

- **Name** of the actuator group
- **Type** of the actuator
  - **Customer data required** (electromechanical component)
  - **SIL / PL exists** (electronic component)
- **Manufacturer** of the actuator
  - When **Siemens** is selected, the corresponding Siemens actuators with the safety-relevant data are recommended.
  - When **Third-party manufacturer** is selected, the safety-relevant data of the actuator can be freely entered (e.g. with non-Siemens components). Details on **Third-party manufacturer** are provided in Chapter 3.4.8
- **S7-Connection** (only actuators without **Integrated communication connection**) – in this field, you can specify whether the actuator is connected to a failsafe PLC via a failsafe digital output module. Upon activation, a sub-system or SRP/CS is automatically created for the failsafe digital output module under **EVALUATION**.

Next, fill in all fields. Help is provided by the tool tips on the fields and via the **Help** button.

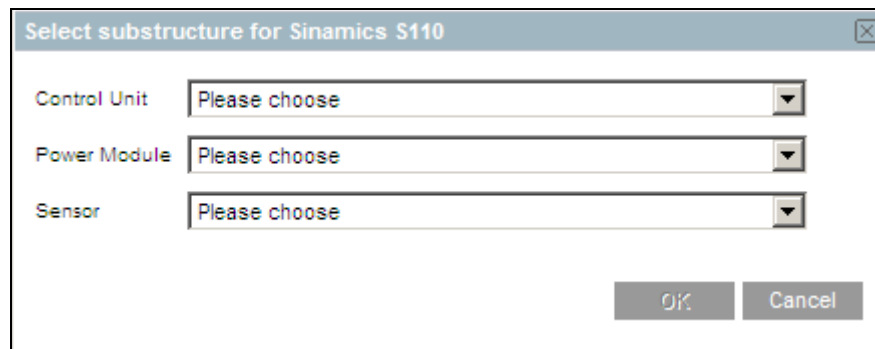
- For SINUMERIK 828D, SINUMERIK 840D sl and the modular fail-safe drive systems SINAMICS S110, SINAMICS S120 AC/AC and SINAMICS S120 modular, from Version V2.0 of the Safety Evaluation Tool, a wizard is available, which supports you when selecting safety-relevant components. It goes without saying that the required components can also be directly selected as before.

The selection Wizard is opened by clicking on the symbol  .



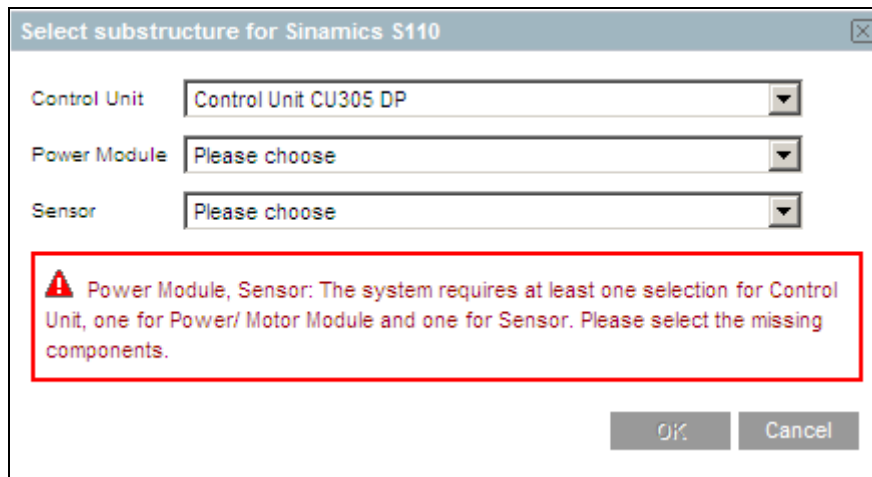
The screenshot shows the Siemens Safety Evaluation Tool interface. The main window is titled "Actuator group - IEC 62061 - General description". The "Productgroup" field is set to "SINAMICS S110". A red box highlights the "Help" button in the top right corner. Another red box highlights the "pencil" icon next to the "Productgroup" dropdown. A third red box highlights a warning message at the bottom: "No product selected." The interface includes a menu bar with options like "File", "Project", "Copy selection", etc., and a sidebar with a project tree.

- The dialog that is now displayed allows a structured selection of the relevant system components (here, using the selection screen form for SINAMICS S110 as example). Please note that when opening the dialog again, the previously entered information is no longer available.



The screenshot shows the "Select substructure for Sinamics S110" dialog box. It contains three dropdown menus for "Control Unit", "Power Module", and "Sensor", all set to "Please choose". There are "OK" and "Cancel" buttons at the bottom right.

The dialog also checks whether all of the required system components have been selected. As long as this is not the case, the following message is displayed, and the system prevents the dialog from being exited.



- As soon as the selection has been completed, after pressing the **OK** buttons the dialog is closed and the selected components appear in the project tree below **EVALUATION** or **REACTION**.
- Under **NAME** now allocate the appropriate designations for the automatically inserted partial systems and/or SRP/CS corresponding to your particular system or machine – and then complete the entries by editing the fields in yellow with the "Please choose" text.

Note

The Safety Integrated Basic Functions of the drives do not require an encoder. In this case, for encoder system you must select "No encoder required". This selection only serves to complete the check. As a consequence, after exiting the dialog, an SRP/CS is not created.

On the other hand, selecting "Sensorless motion monitoring" simultaneously includes a PFH value. After exiting the dialog, a partial system or SRP/CS is created for this purpose.

The selection wizards for SINUMERIK 828D, SINUMERIK 840D sl and for SINAMICS S120 modular in principle has a similar structure. However, here you can also enter the required number for most system components.

Note

The selection Wizard for SINAMICS S120 modular includes basic plausibility checks, e.g. whether the number of selected encoder systems matches the number of Motor/Power Modules.

It cannot replace the **SIZER** engineering tool in which the complete system knowledge is saved.

Then, select the safety function level, in this example **Emergency Stop**, in the navigation tree for display of the calculation result.

### 3.4.12 Result

The result of the safety integrity consideration is displayed in the overview mask of the safety function, in this example **Emergency Stop**, in the form of the **Achieved SIL or PL** and **Achieved PFH<sub>D</sub>**.

The mask layout red differs depending on the used standard.

The screenshot displays the Siemens Safety Evaluation Tool interface. The main window shows the configuration for a safety function named 'Emergency Stop'. The 'Consideration of safety integrity acc. to IEC 62061' section is highlighted with a red box. It shows the 'Required SIL' set to 'SIL 2' and the 'Achieved SIL' also set to 'SIL 2'. The 'Achieved PFH' is displayed as '6.19 E-08'. Below this, a bar chart shows the 'Safetyfunction' with segments for SIL 2 (E-05 to E-06) and SIL 3 (E-07 to E-08). The 'Further functions' section is also visible, with a note: 'To edit an existing subsystem please select the relevant functional area. To insert a new subsystem, please mark the particular functional area.'

#### Note

In the masks, the calculation results are only displayed with two decimal places. However, the Safety Evaluation Tool internally uses more than two decimal places.

### 3.4.13 Report Creation

To generate the result report, select the respective project in the navigation tree, in this example Company XY, and the operate the **Create report** button.

## Report

Date: 8/9/11

### Safety Evaluation Tool

Name:	Company XY
Safety standard:	IEC 62061, Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
Manager:	Bill Smith
Inspector:	John Smith
System type:	Conveyor
Document risk analysis:	Hazard_analyse.doc
Description:	
SET version:	2.0.0-SNAPSHOT-20110518
Product data version:	0.44

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4. Annex subsystems	(page 6)
5. Annex order lists	(page 10)

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## 4 Appendix

### 4.1 References

This list is by no means complete and merely represents a selection of suitable literature.

Subject	Title
Basics	Reference book: Functional Safety of Machines and Systems Order No.: A19100-L531-B123 (can be ordered via your SIEMENS contact partner)

### 4.2 Internet Links

Subject	Title
Safety Evaluation Tool	<a href="http://www.siemens.com/safety-evaluation-tool">http://www.siemens.com/safety-evaluation-tool</a>
Safety Integrated website	<a href="http://www.siemens.com/safety-integrated">http://www.siemens.com/safety-integrated</a>
E-mail address of the Safety Evaluation Tool Customer Support	<a href="mailto:set.industry@siemens.com">set.industry@siemens.com</a>
B10 values for Siemens components	<a href="https://www.automation.siemens.com/mcms/safety-integrated/en/machine-safety/safety-standards/Documents/E20001-A230-M103-V4-7600.pdf">https://www.automation.siemens.com/mcms/safety-integrated/en/machine-safety/safety-standards/Documents/E20001-A230-M103-V4-7600.pdf</a>
MTBF value for Siemens components	The corresponding values are also available on the CS Internet pages (search term: MTBF) <a href="https://support.automation.siemens.com">https://support.automation.siemens.com</a>

### 4.3 History

Version	Date	Modification
V1.0	April 2009	First issue
V2.0	June 2011	Update for SET V2.0