ABB Ability™ Safety Plus for hoists
Reaching new levels of safety
Legislation is changing to comply with SIL
Safety Integrity Level

Safety Integrity Level or SIL is a term used by International Functional Safety Standards including IEC61508 and IEC62061. SIL levels range from 1 to 4. The higher the number, the higher the level of safety and the lower the probability that the safety-related system will fail to carry out the required safety functions.

While there are four SIL levels, IEC62061 does not recognize SIL 4 as if the process requires SIL 4, it’s sometimes said that the process needs to be reconsidered.

<table>
<thead>
<tr>
<th>Safety Integrity Level (SIL)</th>
<th>Probability of dangerous failure per hour in continuous mode (mine hoists)</th>
<th>Relative Safety Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>$\geq 10^{-8}$</td>
<td>$&lt; 10^{-8}$</td>
</tr>
<tr>
<td>3</td>
<td>$\geq 10^{-7}$</td>
<td>$&lt; 10^{-7}$</td>
</tr>
<tr>
<td>2</td>
<td>$\geq 10^{-6}$</td>
<td>$&lt; 10^{-6}$</td>
</tr>
<tr>
<td>1</td>
<td>$\geq 10^{-5}$</td>
<td>$&lt; 10^{-5}$</td>
</tr>
</tbody>
</table>
Your challenges

Some countries, including Sweden and Australia, have included in their mining regulations that hoist systems must include functional safety systems. Other regions are considering implementing similar legislation.

Mandatory or not, more and more mining companies have anyway decided to increase the level of safety of their mine hoists to ensure their employees and equipment are safe.

“I need to get compliant with SIL certification”

“I want to ensure the highest level of safety for my employees and equipment”
ABB does not compromise on safety
ABB introduces ABB Ability™ Safety Plus for hoists

First fully SIL3 certified suite of mine hoist solutions

Designed in accordance with IEC62061 (International “Safety of Machinery” standard)

Rigorously examined and certified by an independent global functional safety certifying body: RISE

Highest level of safety available in the market

About RISE, Research Institute of Sweden
Independent global functional safety certifying body

• RISE is an independent organization that certified ABB’s functional safety products “fulfill the requirements in standard IEC62061” – International Standard for Functional Safety of Machinery.
• RISE provide a wide range of advanced services and support to industry.
• Their roots go back to 1960s and currently, they employ over 2800 “problem solvers”. RISE has a high level of expertise in functional safety and have presented technical papers on functional safety within the mine hoist industry. RISE also provides independent certification services.
• https://www.ri.se/en/about-rise/about-rise
ABBB’s approach to mine hoist safety
ABB Ability™ Safety Plus for hoists portfolio

Safety Plus Hoist Monitor (SPHM) is the world’s first mine hoist safety monitor designed in accordance with IEC62061 international functional safety standards (Safety of Machinery) and achieving Safety Integrity Level 3 for the majority of its safety protections (SRCFs).
SPHM can be easily installed on any mine hoist with any type of control system. It connects into the existing hoist control “safety circuit” and trips the existing “safety circuit” in case it detects a safety hazard.
In addition to the critical “overspeed”, overwind/underwind, SPHM also includes the following additional safety protections:
• Roll-Back, incorrect direction
• Encoder drive failure
• Protection bypass
• Worn friction linings
• Rope Slip
• Rope Miscoiling
• Slack Rope
• Unclutched Drum Movement

Safety Plus Brake System (SPBS) provides the highest level of safety available to the critically important mine hoist brake system. It is the world’s first mine hoist brake system designed in accordance with IEC62061 functional safety standards (machinery) and achieving independent certification by an outside 3rd party organization.
Integrated Electrical and Hydraulic Design ensures fast and reliable brake operation providing ease of mind to you and your employees.
SPBS provides the following SIL 3 based protective functions:
• Bringing the hoist to a safe state (Stop) after a safety circuit trip and maintaining the safe state (emergency braking)
• Holding the hoist unbalance when stopped (service braking)
• Prevention of unexpected brake release when mine personnel are embarking/disembarking the cage (brake channel isolation)
• Holding the unclutched drum unbalance (brake channel disabling)
• Control of hazardous energy during maintenance (brake channel disabling)
• Lowering the hoist unbalance under gravity force in case of extended power outage or failure of the drive system (gravity winding).

Safety Plus Hoist Protector (SPHP) includes all the safety functionality of Safety Plus Hoist Monitor, interfaces with Safety Plus Brake System, with additional SIL based protective functionality to not only the mine hoist itself but as well to the rest of the mine hoist infrastructure including:
• Remote emergency stops in hoist house, headframe, shaft locations, etc.
• Maintenance lock-outs in hoist house, headframe, shaft locations, etc.
• Shaft gate interlock
• Cage door interlock
• Tail rope loop
• Inspection platform monitoring
• Shaft obstruction monitoring
We offer the safest, optimized and fit-for-purpose hoisting solutions.

With ABB Ability™ Safety Plus, take safety to the next level.
ABB Ability™ Safety Plus for hoists offers you peace of mind

- Protect personnel, equipment and infrastructure
- Best in Class Safety
- Highest Reliability
- Fit for your purpose and requirements – ready made safety solutions
- Rugged solutions specifically designed for tough mine environment
- Exhaustively tested in house, approved by an independent global body and already proven at some mine sites

REACHING NEW LEVELS OF SAFETY
ABB Ability™ Collaborative Operations: new ways of working together
Collaboration in data-driven ecosystem

Customer
Apps, view installed assets, view operations

Consultant
Analysis, advanced maintenance, operations optimization

3rd party
Analytics, services, generate solutions

ABB engineer
Remote connection, update task list, live monitor progress

ABB collaboration expert
Root Cause Analysis, advanced services

Web portal

Data gets aggregated and analyzed in the cloud and is available to key stakeholders of the collaborative operations ecosystem so they can make data-driven business decisions

ABB Ability™ Performance Optimization for hoists analyzes data automatically and present actionable insights for engineers at the mill level

Edge devices/ Fog
Data from devices like motors, drives etc. are gathered by sensors and transferred to Edge devices for analysis

Hoist System
ABB Ability™ Safety Plus for hoists
A new first of its kind for ABB in mine hoist systems

1891
ABB’s first electrical motor for a mine hoist in Sweden

1937
ABB’s first one-rope complete Friction Hoist delivered to Kristineberg mine, Sweden (still in operation)

1946
ABB’s first 4-rope friction hoist

1952
First company to use hydraulic disc brake system in mine hoist

1984
First company to deliver PLC controlled mine hoist (DS 100, Asea Master)

2010
ABB’s first 4-channel brake system with closed loop retardation control launched in the world

2017
First fully certified SIL 3 mine hoist safety monitor in the world

2020
First certified SIL 3 Brake System and Hoist Protector System
Let’s talk
We design our solutions to your safety requirements

Benefit from ABB’s mine hoist expertise of almost 130 years
ABB functional safety experts can design your specific safety requirements according to IEC62061 functional safety standards and integrate those protections into our solutions.

Our mining engineering team has been designing the safest, optimized and fit-for-purpose hoisting solutions for almost 130 years and over 1000 hoisting solutions worldwide, integrated with advanced digital services. Our engineers have become domain experts in mine hoist control and safety – an unbeatable combination for the mine hoist industry. They are available to assist you in performing mine hoist risk assessments and SIL determination, implementing functional safety management processes or providing after sales assistance with safety audits.
For contact details, please visit our website: abb.com/mining/safetyplus
Or send an email to minerals@ch.abb.com