GARD

Unparalleled Protection

MINING SEGMENT BROCHURE

MINING & QUARRYING

GARD

Unparalleled Protection

MINING INDUSTRY
Why partner with I-Gard?

The hazardous conditions found in both underground and surface mining requires robust, well engineered solutions and I-Gard has the necessary application experience and design capabilities to meet this challenge.

Our complete range of unparalleled products empowers mining customers to eliminate hazards such as shock and arc flash, reduce downtime due to ground faults and increase the operational life of expensive mining equipment.

Whether the need is to detect ground faults on trailing cable fed portable equipment and protecting personnel from frame shock voltage or ensuring process continuity through the application of high resistance grounding or meeting code requirements and monitoring all impedance grounding paths, I-Gard has you covered.

Our expertise extends to pump protection panels protecting against electrical shock in wet environments to arc flash mitigation using optical arc flash relays.

I-Gard products for Mining applications:

- GCHK-100 Mining Relay and Ground Check monitors
- Neutral Grounding Resistors (NGR)
- SIGMA 3 Ground Fault and Monitoring Relay
- SIGMA 3-TDM Touchscreen Display Module
- i-AVT Absence of Voltage Tester & Voltage Test Port
- SENTRi Ground Fault and Arc Flash relay
- High Frequency Surge Suppressors
- Pump Protection Panels

I-GARD KEY PRODUCTS FOR MINING APPLICATIONS

1 Mining Relays - Ground Check monitors

GCHK-100

Ground Fault Detection from 0.25 -12.5 Amps (13 adjustable pickup settings).

Trip Delay settings from 0.02 - 10 seconds (8 adjustable settings).

Ground Circuit Checking (10, 20, 30, 50 Ohms) through the use of an auxiliary pilot ground detector.

Frame Touch Voltage Protection with four adjustable pickup levels (40,60,80,100 V). Capability to monitor dangerous frame voltages.

m-GARD-SYM display for remote indication.

In compliance with CSA M421-16. Use of Electricity in Mines.

GCHK-PM

Ground Fault Detection from 0.03 -1.5 Amps (13 adjustable pickup settings).

Trip Delay settings from 0.02 - 10 seconds (8 adjustable settings).

Ground Circuit Checking (20, 30, 50 Ohms) through the use of an auxiliary pilot ground detector.

Frame Touch Voltage Protection with four adjustable pickup levels (40,60,80,100 V).

Panel mountable.

In compliance with CSA M421-16. Use of Electricity in Mines.

GCHK-O

Ground checking and control through the use of an auxiliary pilot wire.

Detects and alarms if the ground loop has become shorted (It operates in 200 ms) or has opened (operates in 250 ms).

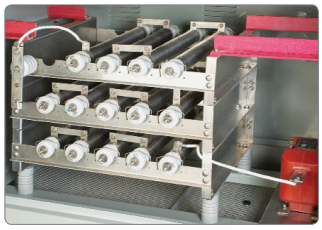
DIN rail mountable, small footprint.

Fail-safe contact operation.

No internal jumpers or settings.

Superior accuracy, simplicity, intuitive LED indicators for alarming.

2 Neutral Grounding Resistors



NGR

For use in HRG and LRG applications up to 69kV.

Elements with low coefficient of resistance for consistent fault current levels.

CSA certified and UL approved.

Edge-wound element design eliminates

hot-spots.

NGR monitoring compliant with CEC 2021.

3 Ground Fault & Monitoring Relay

SIGMA 3 & TDM Touchscreen Display

Combination of resistor monitor and Ground Fault relay.

Ground fault trip time delay from 60 ms to 3150 ms.

NGR let-through current from 1-2500 Amps.

Suitable for HRG and LRG systems.

Pulsing function for ground fault location available via display.

Modbus RTU, TCP/IP communication.

4 Absence of Voltage Tester

i-AVT (Absence of Voltage Tester)

Positive Indication of Absence of Voltage (green LED lights).

Indication of presence of hazardous voltage (red LED lights).

Super Capacitor technology for offline power.

DIN rail mounted (control box) and Door mounted Display.

Listed and labeled as per UL1436 section 12 requirements.

5 Voltage Test Port

VTi (Voltage Test Port)

Voltage Indicator (4 indicating red LEDs lights).

Voltage Test Port to measure actual voltage with any hand-held meter.

Rotary transparent cover to access to test points.

Simple to install, 4-wire connection.

Small footprint, 30.5mm standard knockout.

6 Arc Flash Relay

SENTRi (Ground Fault protection & Arc Flash relay)

40 trip levels from 0.1 Amps up to 1200 Amps.

Less than 1ms trip time on arc flash.

Remote monitoring and arc flash mitigation in one relay.

ZSIP (Zone Selective Instantaneous Protection) for coordination with other Sentri relays downstream or upstream, it minimizes damages and maximize protection.

Modbus capability with m-GARD-SYM display.

Connects to 3 self-monitoring arc flash sensors (light, pressure sensors.

7

GP/GPA - Pump Protection Panels

Designed to provide instantaneous ground fault protection up to 600V and 85A with a maximum of 5 or 10 mA of ground leakage current.

The trip level is factory set and non adjustable by user.

Models available for solidly grounded, resistive grounded and ungrounded systems.

System voltage levels: 208, 240, 480 and 600V.

All types are CSA approved & UL recognized (10mA sensitivity and above).

8 Surge Suppressor Technology - ZORC

High Frequency Surge Suppressor

High frequency transient overvoltage surge suppressor for the protection of:

Motors, transformers and generators from steep wave-front, short rise-time, high magnitude, spikes, surges, and circuit switching.

Eliminates multiple pre and re-strike transients associated with vacuum and other switchgear.

Suitable for both switchgear panel and machine terminal box mounting.

System Voltage: 400 V to 40 kV.

Transient protection: 0.1 to 0.2 micro seconds range.

MINING APPLICATION

Figure 1 shows how a mining operation in Peru has adopted I-Gard technology to minimize risks of electrical hazards (shock and arc flash events) and to improve safety of their personnel from bottom to top level of the electrical distribution system.

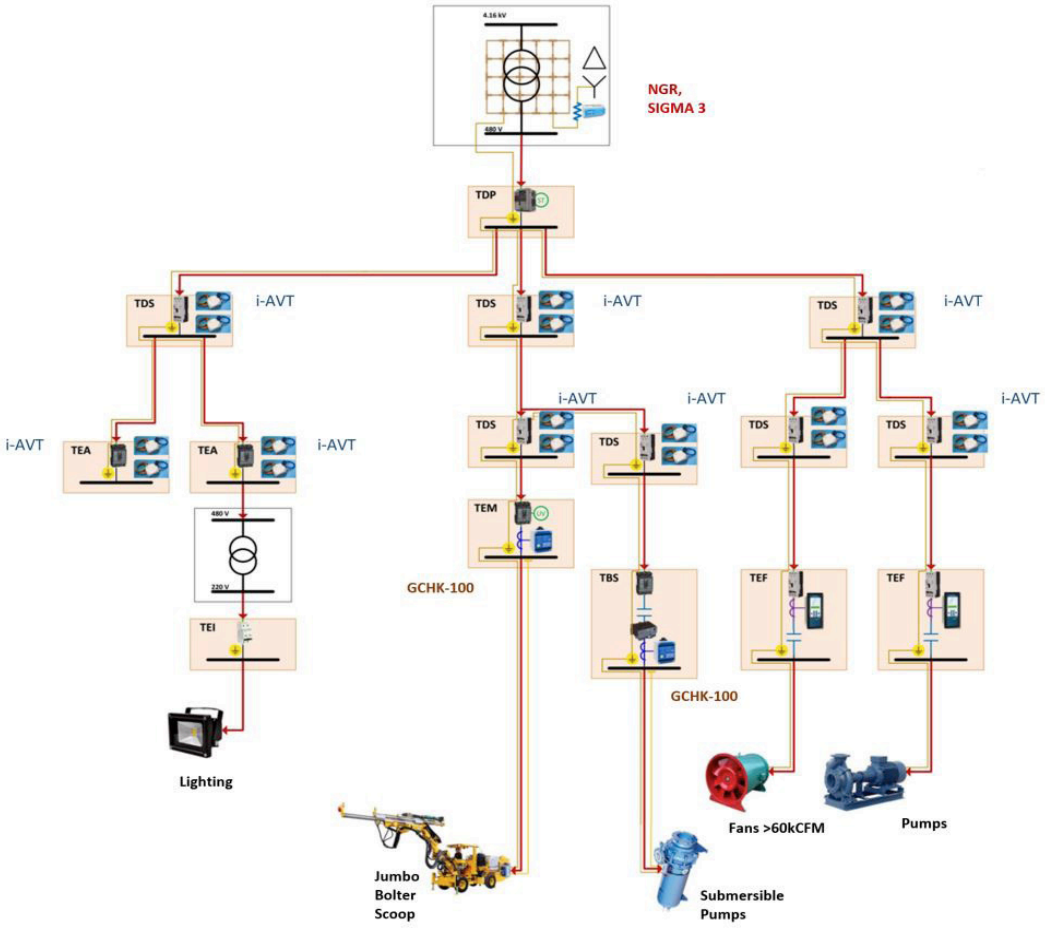


Figure1: I-Gard Technology installed in a Mining Operation

NGR + SIGMA 3 Relay
i-AVT
GCHK-O

Let's go over the schematic shown in Figure 1 and identify the different technologies this mining operation has adopted in order to not only be in compliance with the Peruvian Mining Code, but also excel in their efforts to make their operation safer and more reliable. Starting from the upper level, an High Resistance Grounding (HRG) system is installed at the distribution transformer. It includes a Neutral Grounding Resistor NGR and Ground Fault Monitoring relay.
According to NFPA-70E, Annex O, HRG is an arc flash mitigation technique. It has been documented that between 80% and 95% of all electrical faults initiate as a single phase -to-ground faults. By limiting the ground fault current to a small magnitude (less than 10 Amps), a great majority of phase-to-phase arcing faults can be eliminated. Therefore, the application of HRG alone reduces the probability of an arc flash event in 80-95%.

Another fact worth to mention is that this mining facility is in full compliance with the Mining Code requirements when it comes to monitoring the integrity and health of the Neutral Grounding Resistor (NGR).
Every resistor grounds the secondary of the transformer, and is being continuously monitored by a Ground Fault and Resistor Monitoring Relay. This relay is able to detect if the path from X0 and ground has been shorted or is open. Both conditions are abnormal and will trigger an alarm and/or trip the breaker.
The third factor that adds safety to personnel is to permanently monitor the ground continuity of trailing cables that feed power to mobile equipment, and any dangerous voltage that can be present on the equipment frame due to poor ground connection. This mining facility has chosen state of the art technology that allows to perform three different protection functions in one single relay: Ground Fault, Ground Check and Frame Voltage.

The fourth addition that complements the use of the other technologies, is the Absence of Voltage Tester. This technology greatly reduces the risk of electric shock and electrocution. The Absence of Voltage Tester meets requirements of UL 1436.

Mining activities are in nature subjected to different kind of risks and they need to be eliminated or mitigated. This Peruvian mining facility has taken active steps to adequate to the latest NFPA-70E standards, to eliminate and/or mitigate the electrical risks using available technology, which makes their operation safer by reducing wrong interpretation or human errors.

MINING AND QUARRYING

I-Gard values its long standing relationships with hundreds of industry leaders and widely recognized institutions, many of which are in the Mining industry. Discover which companies have used and continue to use I-Gard products. Please see a small portion of our Mining clients outlined below.

Customer	Product	Location	Year
Minera Volcan	i-AVT	Lima, Peru	2021-2022
SFFPPN Sept-îles	NGR, SIGMA 3	Quebec, Canada	2021
Rhona	NGR	Vina del Mar, Chile	2021
EECOL	GCHK-100	Santiago, Chile	2020
Agnico Eagle La Ronde	DSP-OHMNI, NGR, SIGMA 3	Quebec, Canada	2020
OEM Electric	GCHK-100	Lima, Peru	2020
OEM Electric	NGR + SIGMA	Lima, Peru	2020
New Gold Mine	NGR	British Columbia, Canada	2020
Craig Mine	DSP-OHMNI	Ontario, Canada	2020
Rio Tinto Saguenay	DPS-OHMNI, NGR	Quebec, Canada	2020
Lehigh	VIA	British Columbia, Canada	2019
ArcelorMittal Contrecoeur	DSP-OHMNI, NGR	Quebec, Canada	2019
Diavek Diamond Mine Inc.	NGR	Northwest Territories, Canada	2019
Mainland Sand & Gravel	NGR + SIGMA	British Columbia, Canada	2018
Teck	DSP-223	British Columbia, Canada	2018
Eaton	GCHK-100	Santiago, Chile	2018
Red Chris Mine	DSP-OHMNI	British Columbia, Canada	2017
Schneider Electric France	DSP-OHMNI	France	2008
Surplec Inc.	DSP-OHMNI	Quebec, Canada	2007
Harris & Roomie Supply Limited	Sleuth	Nova Scotia, Canada	2007
Wesco	Sentinel	Quebec, Canada	2007
Wesco	Stoplight	Quebec, Canada	2007
ABB Brazil	DSP-OHMNI	Brazil	2006
Niobec Mine	DSP MK lll System	Quebec, Canada	2006
MGB	DSP-OHMNI	Quebec, Canada	2006
Guillevin for Tech Cominco	DSP-FM-S12	British Columbia, Canada	2006
Raglan Mine	DSP MK lll System	Quebec, Canada	2006
QIT	DSP MK lll System	Quebec, Canada	2005
Minera Yanacocha	NGR	Peru	2001

ArcelorMittal

VOLCAN
VOLCAN COMPAÑÍA MINERA S.A.A

Teck

RioTinto

BUENAVENTURA

MAINLAND
SAND & GRAVEL

ABOUT I-GARD

I-Gard's commitment to electrical safety provides both industrial and commercial customers with the products needed to protect their electrical equipment and the people that operate them.

As the only electrical-safety focused company whose product portfolio includes neutral grounding resistors, high-resistance grounding systems and optical arc mitigation, we take pride in our technologies that reduce the frequency and impact of electrical hazards, such as arc flash and ground faults.

For those customers who have purchased from us over the last 30 years, you know us for the quality and robustness of our product, our focus on quality, customer service and technical leadership. We build on this foundation by investing in developing new products in electrical safety education by actively participating in the IEEE community programs on technical and electrical safety standards, and working with local universities at uncovering new technologies. We remain unrelenting in our goal of improving electrical safety in the workplace.

Our commitment to excellence is validated by our long-standing relationships with industry leaders in fields as diverse as oil and gas, hospitals, automotive, data centres, food processing, aerospace, water and waste water, and telecommunications.

We provide them with the product and application support required to ensure that their electrical distribution system is safe and reliable.

3 SOLUTIONS & FACTS ABOUT I-GARD

I-Gard offers more HRG products at more price points than any other competitor in the industry, with customized solutions for your specific application.

I-Gard is the exclusive supplier of FAIL-SAFE and ADVANCED HRG systems with 2nd ground fault protection to better match your need for electrical reliability and safety.

We are the only HRG supplier that also offers optical arc mitigation for Total Protection against ground faults and arc flash incidences.

- The first power resistor company in North America to be ISO 9001 certified.
- The only resistor manufacturer with a CSA-approved testing facility in-house under CSA SMTC program including CSA 295-15 and CSA 22.2 Part 1.
- The only resistor manufacturer with UL listing of our complete NGR product offering.
- Approved by the Government of Canada in its Controlled Goods Program for Defense applications.


Certificate of Qualification

THIS IS TO CERTIFY THAT

I-Gard Corporation

7686 Bath Road, Mississauga, ON L4T 1L2 Canada

has been qualified by CSA Group Testing & Certification Inc., as a Testing Facility for

Supervised Manufacturer's Testing for Certification Program

Based on ISO/IEC 17025:2017

ISSUED DATE: March 23, 2020

EXPIRY DATE: March 23, 2023

Samuel Balson
Operations Manager


intertek

CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

I-Gard Corporation

has been registered by Intertek as conforming to the requirements of:

ISO 9001:2015

The management system is applicable to:

Manufacture of electrical safety products for industrial applications.

Intertek

Calin Moldovean
President, Business Assurance

- Visit: www.i-gard.com to get access to our technical documentation and certificates.

Designed & Manufactured in Canada

ISO 9000 CE CSA UL

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SEGMENT BROCHURE

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ISO 9001:2015