SANDVIK

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

DCP Cable Bolts

DSI Underground Australia Pty Limited
(a Sandvik company)

Programme: The International EPD® System www.environdec.com
Programme operator: EPD International AB
Regional Programme: EPD Australasia www.epd-australasia.com
EPD Registration no. EPD-IES-004934:001
Date of issue 2025-06-06 | Valid until 2030-06-06
Geographical scope: Australia

EPD of multiple products (based on a representative product) from one location.
The list of DCP Cable Bolts covered by the EPD can be found on page 6.
An EPD should provide current information and may be updated if conditions change.
The stated validity is therefore subject to the continued registration and publication at www.environdec.com

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EPD® AUSTRALASIA INTERNATIONAL EPD SYSTEM
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Contents

Disclaimer

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Program information and verification

An Environmental Product Declaration (EPD) is a standardised way of quantifying the potential environmental impacts of a product or system. EPDs are produced according to a consistent set of rules – Product Category Rules (PCR) – that define the requirements within a given product category. These rules are a key part of ISO 14025 as they enable transparency and comparability between EPDs. This EPD provides environmental indicators for Sandvik´s DCP Cable Bolts produced at our plant in Newcastle, NSW. This EPD is a "cradle-to-gate with module C and D" declaration covering cradle-to-gate production of the products, plus their end-of-life. This EPD is verified to be compliant with EN 15804+A2. EPDs of construction products may not be comparable if they do not comply with EN15804. EPDs within the same product category but from different programs or utilising different standards or PCRs may not be comparable (see the full disclaimer on the previous page).

DSI Underground Australia Pty Limited, as the EPD owner, has the sole ownership, liability, and responsibility for the EPD.

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Independent verification of the declaration and data, according to ISO 14025:	☒ EPD verification by individual verifier		
Third party verifier: Approved by EPD Australasia Ltd	Sazal Kundu, Edge Impact Greenhouse, Level 3, 180 George Street, Sydney, NSW 2000, Australia Web: www.edgeimpact.global Phone: +61 2 9438 0100 Email: sazal.kundu@edgeimpact.global		
Procedure for follow-up of data during EPD validity involves third party verifier	☐ Yes ☒ No		

About Sandvik Group

Ground Support Division

Sandvik is a global, high-tech engineering group providing solutions that enhance productivity, profitability, and sustainability for the manufacturing, mining and infrastructure industries.

The Sandvik Group comprises three business areas: Sandvik Mining and Rock Solutions, Sandvik Rock Processing Solutions and Sandvik Manufacturing and Machining. The Ground Support Division is a key component of Sandvik Mining and Rock Solutions

Our products and services prioritize safety and efficiency, supported by a resilient global supply chain and a team of experienced specialists. As a major supplier of ground control solutions for the mining and tunneling industry, we offer a comprehensive product portfolio and hold a strong market position. We are committed to ongoing development of new technologies aimed at improving project safety and efficiency.

We are one of the largest manufacturers and suppliers of specialist strata reinforcement and support products. Strengthening our local footprint, the APAC region have three production sites in Australia (Newcastle, Perth and Brisbane) and one in Indonesia (Surabaya). We pride ourselves on producing locally to guarantee the best service and a short, secure supply chain to benefit our customers. We also have branches strategically placed to service our customers locally.

We deliver intelligent end-to-end solutions to improve safety in underground mining and tunnelling.

We provide Ground Support miners can rely on - millions of rock bolts, thousands of tonnes of chemicals, mesh, quality processes and high manufacturing standards with significant in-house testing facilities.

We keep people safe.

Product description

The Double Corrosion Protected Cable Bolt (DCPCB) is a high load, flexible cable version of a tried and proven solid DCP bolt. The DCP Cable Bolts covered by this EPD are produced at our Newcastle factory in New South Wales.

The DCP cable is anchored into strata with a rotationally engaged (threaded) expansion shell. Tension is applied using a nut on the DCP cables tensioning head. The cable is post grouted via the top-down method using a grout port on the tensioning head. The cable is assembled at DSI Underground and shipped ready to install with a compatible dome plate.

Key features

– A plastic HDPE encases the cable from down to the tensioning head providing a barrier to combat the effects of corrosion. The HDPE sleeve has deformations for load transfer to flow from the cable to rock interface when fully grouted.

– Top-down grouting is achieved by pumping through a grout port on the tensioning head. The grout then flows up the inside of the HDPE sleeve then out the top and down the outer annulus.

– The tensioning head assembly can sustain collar loads of between 52 and 55 tonnes.

– The bolt is provided with an expansion shell for preloading, thus allowing for tunnel or mine heading to advance without immediate grouting.

– Spherical seat for grout cup alignment.

– Stainless steel dome washer with plastic isolation system to separate black and stainless-steel components.

Installation Guidelines

– Drill a Ø57 to Ø60mm bore hole (nominal size Ø58mm).

> Domed washer plate is fitted to the bolt.

> The bolt is inserted into the hole.

– After placing the bolt in the hole to its full length, the bolt is then rotated to set the expansion shell and tension head to the required tension typically >55kN.

– Attach grouting adaptor to Grout Bell.

– Mix 0.33 to 0.35 W/C grout. Pump grout. Grout is pumped through the inner annulus to the bolt end and returns along the outer annulus.

– Terminate grouting with visible grout return.

– Detach adaptor and proceed to next bolt.

Standard Lengths and Packaging

Available DCP cable bolt lengths range from 5 500 to 9 500mm, in 500mm increments, and including a 6 700mm long product.

Non-standard lengths are available by negotiation.

Notes

Only Sandvik rock bolt components should be used to enable the optimum performance of the bolt system to be obtained.

Sandvik Mining Products Division is Quality Assured to ISO 9001:2015, Registration QMS 41328.

Figure 1: DCP Cable Bolt

Figure 2: Grout dome

Physical Properties

Table 1: Physical properties of Double Corrosion Protected (DCP) Cable Bolts

Parameter	Minimum	Typical
Yield strength	495kN	525kN
Tensile strength	573kN	595kN
Strand mass per meter		2.7kg
Fittings weight		3.6kg
Cable (strand) diameter		21.8mm
Expansion shell bore hole range		Φ58 to Φ60mm
HDPE sheathing wall thickness	2mm	2.0 to 2.5mm

Product codes

The product codes for DCP-Bolts are **UN CPC 42944** (Bolts and similar articles, of iron, steel, copper or aluminium) and **ANZSIC Class 2292** (Nut, bolt, screw and rivet manufacturing).

Declared unit

The declared unit is “1 kg of DCP Cable Bolts”.

The EPD covers bolts ranging from 5 500 mm to 9 500 mm length. The mass of DCP Cable Bolts (including barrel and wedge, and grout dome) of various lengths is included in the following table, which can be used to convert the results per declared unit to a particular length of bolt. The 7 500mm long DCP Cable Bolt is used as the representative product for all DCP Cable Bolts covered by this EPD, as this product’s length is the closest to the mean average.

Table 2: Conversion factors for various lengths of Double Corrosion Protected (DCP) Cable Bolts

DCP Cable Bolt length (mm)	Mass (kg)	DCP Cable Bolt length (mm)	Mass (kg)
5 500	20.46	7 500	26.08
6 000	21.88	8 000	27.47
6 500	23.29	8 500	28.87
6 700	23.85	9 000	29.23
7 000	24.68	9 500	30.31

Product Composition

Table 3: Product Composition, DCP Cable Bolts per Declared Unit (1 kg of DCP Cable Bolts)

Product Components	Mass (kg)	Post-Consumer Recycled Material (weight-% of product)	Biogenic material, (weight-% of product)	Biogenic material kg C/product or declared unit
Steel Cable	0.687 – 0.756	0%*	0%	0
Stainless Steel Grout Dome	0.034 – 0.050	0%*	0%	0
Steel Bolt Barrel and Nut Pinning	0.049 – 0.073	0%*	0%	0
HDPE Corrugated Sheath	0.058 – 0.072	0%	0%	0
Steel Ultrastrand Wedge Assembly	0.008 – 0.012	0%*	0%	0
Steel Bail and Two Leaf Assembly	0.018 – 0.027	0%*	0%	0
Steel Expansion Shell Wedge	0.022 – 0.033	0%*	0%	0
Steel Thrust Bearing Ball	0.008 – 0.012	0%*	0%	0
Steel Key Washer	0.007 – 0.010	0%*	0%	0
GFR PP Isolation Washer	0.002 – 0.003	0%	0%	0
Stainless Steel Retaining Clip	0.001 – 0.002	0%*	0%	0
GFR PP Centraliser	0.004 – 0.006	0%	0%	0
Steel Expansion Shell Bolt and Barrel	0.018 – 0.027	0%*	0%	0
Total	**1.000**	**0%***	**0%**	0

** Steel typically contains recycled content. As our suppliers do not declare (post-consumer) recycled content, the PCR requires declaration of zero percent.*

Table 4: Packaging Composition, per Declared Unit (1 kg of DCP Cable Bolts)

Packaging materials	Mass (kg)	Mass (% versus the product)	Biogenic material (kg C/ declared unit)
PE foam	0.0034	0.34%	0
Timber gluts	0.0084	0.84%	0.0042
Steel bands	0.0007	0.072%	0

The DCP Cable Bolt products do not contain any biogenic carbon.
The product included in this EPD does not contain any substances of very high concern as defined by European REACH regulation (ECHA 2024) in concentrations >0.1% (m/m).

Scope of the Environmental Product Declaration

This EPD covers the cradle-to-gate plus end-of-life life cycle stages (modules A1-A3, C1-C4, D).

Construction and use stages have not been included as we cannot define a typical scenario for our range of DCP Cable Bolts. These impacts are best determined at project level.

The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in Table 5.

Table 5: Scope of the EPD

Stages	Product Stage			Construction Stage		Use Stage							End-of-life Stage				
	Raw Material	Transport	Production	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste Processing	Disposal	Reuse, recovery, recycling potential
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	CN AU USA	AU	AU										AU	AU	AU	AU	AU
Share of specific data	4%*																
Variation – products	<10%																
Variation – sites	0% (n/a)																

X = module is included in this study
ND = module is not declared. When a module is not accounted for, the stage is marked with “ND” (Not Declared).
ND is used when we cannot define a typical scenario.

* The percentage specific data is low as our production process is mainly an assembly operation. The components are sourced from third-party suppliers for which generic data have been used.

Description of life cycle stages

Raw Material Supply (A1)

The main inputs used to produce DCP Cable Bolts are steel cables, corrugated HDPE plastic sheaths, steel bolt barrels and nut pinnings, stainless steel grout domes, and various other minor parts (refer to Table 3 for specific product components). These components are manufactured by Sandvik's suppliers, which are predominantly located in China. The Chinese suppliers are assumed to use steel or stainless steel produced in China.

Transport (A2)

Most materials and components used to produce DCP Cable Bolts are sourced from China, followed by Australia and the USA. Local transport (by truck) from supplier to Sandvik is included, as well as transport (by truck) from overseas suppliers to a local port, shipping from overseas ports to Sydney and transport (by truck) from Port Botany in Sydney to Newcastle.

Manufacturing (A3)

The manufacturing process of DCP Cable Bolts involves the following steps (see figure 3):

1. Cut Cable: the production begins with cutting the steel cable to the desired length
2. Welding the Ends: the cable ends are finished by welding the strands together and ground to remove burrs
3. Bell and Sheath: Grout bells are crimped to corrugated plastic sheaths; the cable is manually fed through
4. Expansion Head: The Expansion head is attached to the DCP Cable Bolts, both the head and bell are secured in place with a wedge
5. Quality Control and Testing: Quality control measures are implemented to ensure that the bolts meet the required specifications. This includes dimensional checks, and testing for mechanical properties
6. Packaging: Once the DCP Cable Bolts pass the quality control checks, they are typically tied in bundles within a reusable metal cradle, with plastic strapping and heavy-duty PE foam wrapped around the ends to protect the bells and expansion shells

End-of-life (C1-C4)

The end-of-life modules for DCP Cable Bolts are perhaps somewhat unusual because the products stay in place "forever", as they are used to stabilise the ground and are not removed once placed. As a result, no environmental impacts are recorded in end-of-life modules C1 (deconstruction / demolition), C2 (transport from the demolition site to a recycling centre or landfill site), C3 (recycling processes), and C4 (disposal in a landfill site).

Loads and benefits beyond the system boundaries (D)

Module D sits outside the system boundaries and calculates the effect of the net flow of scrap over the life cycle of the product.

Since the bolts stay in place at the end-of-life, the net flow of scrap is zero when the inputs consist of 100% virgin material, or negative when the input material contains recycled content. As the input of secondary scrap into the product system is greater than the amount of scrap made available for recycling at end-of-life (see Table 6), there is a net inflow of scrap (0.173 kg scrap per kg bolt/plate combination), resulting in a debit in module D.

Module D loads and benefits are calculated in line with the following formula[1] from EN 15804:

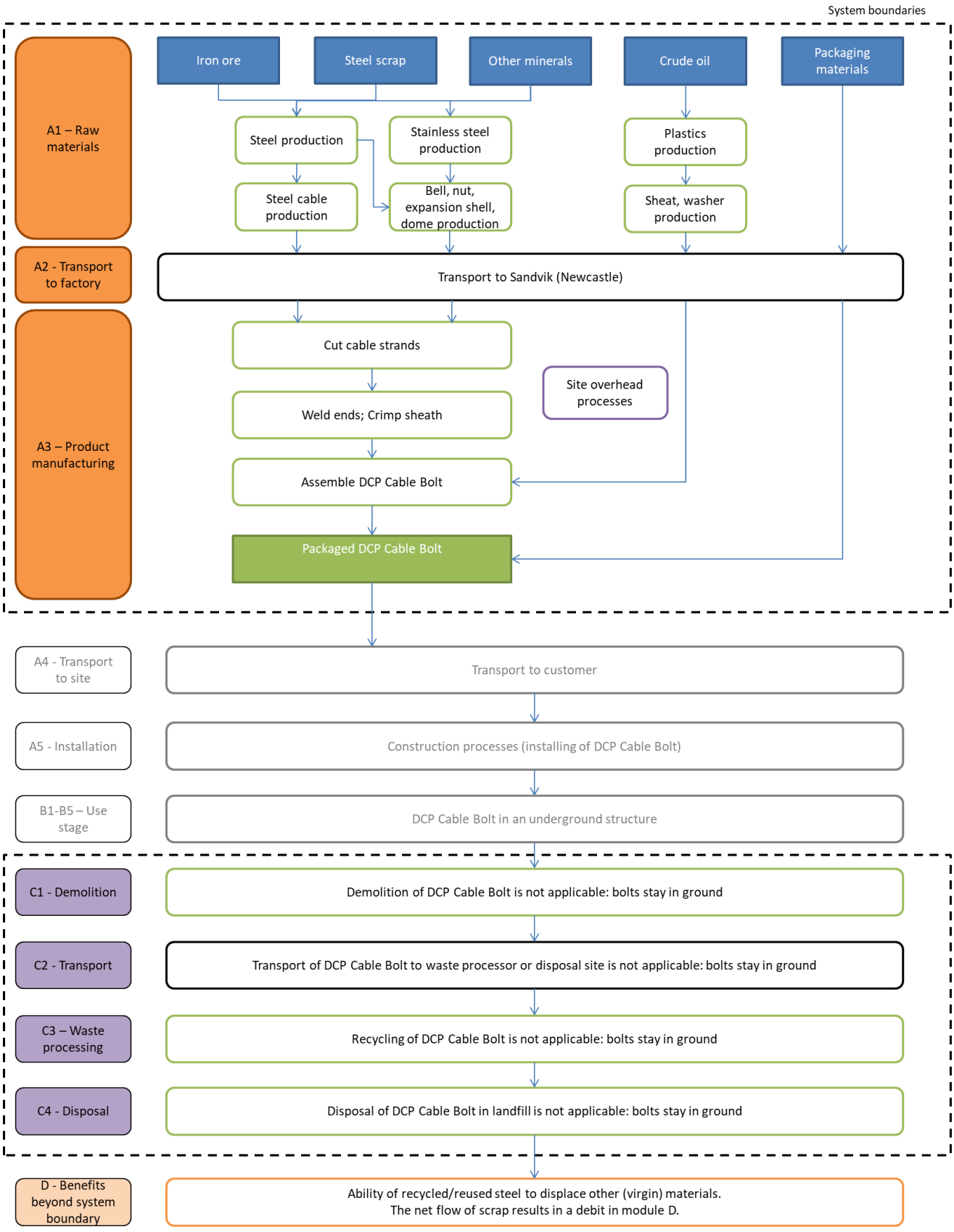
$$e_{module\ D1} = \sum_i \left(M_{MR\ out}\big|_i - M_{MR\ in}\big|_i\right) \cdot \left(E_{MR\ after\ EoW\ out}\big|_i - E_{VMSub\ out}\big|_i \cdot \frac{Q_{R\ out}}{Q_{Sub}}\Big|_i\right)$$

Table 6: Parameter values relating to Module D

Parameter	Unit/effect
$M_{MR\ out}$ = 0%	amount of cable bolts exiting the system that will be recycled in a subsequent system
$M_{MR\ in}$ = 17.3%	amount of recycled steel input material in DCP Cable Bolts across the range of all components
Y = 100%	the material yield, between point of end-of-waste (M-EoW) in modules A4-C4 and point of substitution (M-DoS) in module D (when the material has been upgraded).
$E_{MR\ after\ EoW\ out}$ = steel recycling (EAF process)[2]	specific emissions and resources consumed per unit of analysis arising from material recovery processes of a subsequent system after the end-of-waste state Process: *Steel, low-alloyed {RoW}| steel production, electric, low-alloyed | Cut-off, U*
$E_{VMSub\ out}$ = steel production (BOS process)[3]	specific emissions and resources consumed per unit of analysis arising from acquisition and pre-processing of the primary material, or average input material if primary material is not used, from the cradle to the point of functional equivalence where it would substitute secondary material that would be used in a subsequent system Process: *Steel, low-alloyed {RoW}| steel production, converter, low-alloyed | Cut-off, U*
$Q_{R\ out}$	quality of the outgoing recovered material
Q_{Sub}	quality of the substituted material
$Q_{R\ out} / Q_{Sub}$ = 1	quality ratio between outgoing recovered material and the substituted material is assumed to be 1 (equal quality)

[1] As per the PCR, the following correction of equation D.6 in Annex D of EN 15804 is made: "Σ (M MR out - M MR in) …" is replaced with "Σ Y· (M MR out – M MR in) …".
[2] EAF = Electric Arc Furnace
[3] BOS = Basic Oxygen Steelmaking

Figure 3: System Boundary Diagram of DCP Cable Bolt Products



Life Cycle Assessment (LCA) Methodology

Background Data

Primary data were collected from the production facility in Newcastle (NSW), where DSI Underground produces a range of bolts, including the DCP Cable Bolt. The production data have been collected for financial year 2021 (1 July 2020 – 30 June 2021). These data are representative for bolt production in 2025 as there have been no changes in the production process and production (assembly) has a minor contribution to the environmental impacts of our products only.

Background data have predominantly been sourced from ecoinvent (v3.10) and AusLCI v1.42. Where necessary, processes have been adjusted to improve geographic representation. The data used for key raw materials and components are:

- **Steel wire cable**: ecoinvent v3.10 processes *Steel, low-alloyed {CN}| steel production, converter, low-alloyed | Cut-off, U* and *Wire drawing, steel {CN}| wire drawing, steel | Cut-off, U*.
- **Grout dome** (stainless steel): ecoinvent v3.10 processes *Steel, chromium steel SS316 {CN}| steel production, electric, chromium steel 316 | Cut-off, U** and *Turning, chromium steel SS316, conventional, average/CN U**
- **Corrugated sheath**: AusLCI v1.42 processes *high density polyethylene, average, at plant/AU U* and *Thermoforming, with calendering/RER U/AusSD U*
- **Other steel components:** ecoinvent v3.10 processes *Steel, low-alloyed {CN}| steel production, converter, low-alloyed | Cut-off, U* and *Turning, steel, conventional, average/CN U*

* The stainless steel 316 process is based on the ecoinvent process for Chromium Steel 18/8. The composition has been adjusted to reflect 316 S/S, which contains 17% chromium and 12% nickel.

The environmental profiles of our DCP Cable Bolts are predominantly based on life cycle data that are less than five years old. Background data used is less than ten years old or has been reviewed for relevance within this period.

Methodological choices have been applied in line with EN 15804+A2; deviations have been recorded.

Cut-off criteria

Where possible (i.e. for which data are available), all inputs and outputs to a process have been included. The cut-off criteria applied are 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of a process.

The materials and processes that have been excluded are:

- Ancillary materials used in the plant, including but not limited to conveyor belts and other machinery wear and tear replacements.
- Waste from overhead processes (e.g. offices).

Other ancillary materials (greases and lubricating oils, acetylene) used during production, have been included even though they fall well below the cut-off threshold.

The contribution of capital goods (production equipment and infrastructure) and personnel is excluded from foreground and background data, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

Key Assumptions

The key choices and assumptions in the LCA are:

- Transport fuel use is based on average Australian transport processes, 2011. Modifications were made to account for Sandvik's specific situation (e.g. average load), when known.
- The percentage waste (offcuts) generated during production (2.2%) is calculated based on the ratio of waste collected for recycling and total production volume (across multiple products).
- Steel offcuts from the production of bolts have a positive economic value. Nonetheless, we applied a conservative approach and allocated all production impacts to the main products. This also ensures the allocation applied to offcuts leaving the product system matches the allocation applied to scrap entering the product system.
- For Module D calculations, we have assumed all steel components contain 17% recycled content, all stainless-steel components contain 55% recycled content, and all other components consist of 100% virgin content.

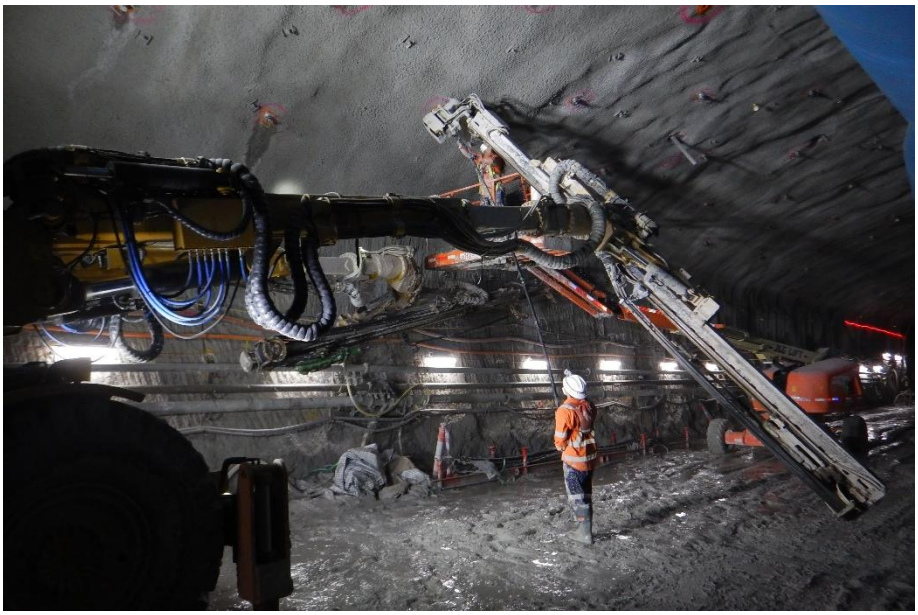
Allocation

The materials, products and processes in the life cycle of Sandvik's products that require allocation are:

- Co-production of DCP Cable Bolt and other products: Sandvik manufactures a range of tunnelling products and accessories at its site. Energy use for DCP Cable Bolt and other production has been allocated to the products based on a mass basis (total tonnage of products produced).
- Co-production of steel products and steel offcuts collected for recycling. The steel offcuts have a minor positive value, which indicates economic allocation is an option. Nonetheless, we have opted for economic allocation assuming zero value (similar to cut-off approach), assigning all impacts to the bolts. This approach is conservative, respects the main purpose of the process, reflects the polluter-pays-principle, and ensures consistency in allocation with scrap entering the product system.
- Background data: Co-production allocation of steel and slag and recycling allocation of steel scrap inputs in steel production. As no information is available from the supplier, generic ecoinvent v3.10 data have been used to model steel production via Blast Furnace/Basic Oxygen Steel-making route. As per ecoinvent's model:
    - Slag co-products have been cut-off; i.e. no environmental impacts have been assigned to steel slags. This is a conservative approach as all impacts are assigned to the steel product.
    - Secondary material inputs (e.g. steel scrap) reach end-of-waste state at the entry gate to a recycling facility. The processing (sorting, pressing and transport) is included within the system boundary of the receiving life cycle, but the inputs are treated as burden free (without prior environmental impacts from the previous life cycle). As co-product allocation cannot be applied to incoming scrap (the required information from the previous life cycle is not available), cut-off allocation has been accepted.
- Allocation of production waste going to landfill follows physical causality rules in background processes.
- Recycling allocation at end-of-life: The cable bolts stay in the ground once installed. The materials therefore do not reach the end-of-waste state.
    - For module D calculations, the net flow of steel scrap can still be calculated.

Electricity

Electricity has been modelled for processes that Sandvik controls using a market-based approach based on adjusted AusLCI data to represent the estimated residual electricity grid mix in NSW. This is done by removing renewables from the Australian Energy Statistics 2024 data (Table O2). The GWP-GHG of the electricity is 0.89 kg CO_2e / kWh. The proxy residual grid mix is made up of black coal (94.0%), natural gas (5.2%) and oil products (0.8%). The selection of a market-based or location-based electricity grid mix has no material impact on the results. If a location-based approach was taken, the carbon footprint would be 0.14% lower.



Life Cycle Assessment (LCA) indicators

An LCA serves as the foundation for this EPD. An LCA analyses the production systems of a product. It provides comprehensive evaluations of all upstream and downstream energy inputs and outputs. The results are provided in a form which covers a range of environmental impact categories.

Table 7: Environmental indicators legend (EN 15804+A2)

Core indicators	Acronym	Unit
Climate change – total	GWP-total	kg CO_2 equivalent
Climate change – fossil	GWP-fossil	kg CO_2 equivalent
Climate change – biogenic	GWP-biogenic	kg CO_2 equivalent
Climate change – land use and land use change	GWP-luluc	kg CO_2 equivalent
Ozone layer depletion	ODP	kg CFC-11 equivalent
Acidification	AP	mol H^+ equivalent
Eutrophication aquatic freshwater	EP-freshwater	kg P equivalent
Eutrophication aquatic marine	EP-marine	kg N equivalent
Eutrophication terrestrial	EP-terrestrial	mol N equivalent
Photochemical ozone formation	POCP	kg NMVOC equivalent
Abiotic depletion potential – elements[1]	ADP minerals and metals	kg Sb equivalent
Abiotic depletion potential – fossil fuels[1]	ADP fossil	MJ, net calorific value
Water use[1]	WDP	m^3 world equivalent deprived
Additional indicators	**Acronym**	**Unit**
Global Warming Potential – Greenhouse gases	GWP-GHG	kg CO_2 equivalent
Particulate matter emissions	PM	disease incidence
Ionising radiation, human health[2]	IRP	kBq U235 equivalent
Ecotoxicity (freshwater)1	ETP-fw	CTUe
Human toxicity, cancer effects[1]	HTP-c	CTUh
Human toxicity, non-cancer effects[1]	HTP-nc	CTUh
Land use related impacts / soil quality[1]	SQP	- (dimensionless)
Additional GHG indicator	**Acronym**	**Unit**
Carbon footprint in line with IPCC AR5[3]	GWP-GHG (IPCC AR5)	kg CO_2 eq

Footnotes:

[1] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

[2] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

[3] **Note regarding various GWP indicators:** GWP-total is calculated using the European Union's Joint Research Centre's characterisation factors (CFs) based on the "EF 3.1 package" for CFs to be used in the EU's Product Environmental Footprint (PEF) framework. CFs listed by JRC are based on the IPCC AR6 method (IPCC 2021) and include indirect radiative forcing, which results in higher numerical Global Warming Potential (GWP) values than the CFs in the internationally accepted (IPCC 2013). The GWP-GHG indicator is identical to GWP-total except that the CFs for biogenic CO_2 are set to zero. The GWP-GHG indicator in PCR 2019:14 v1.3.4 differs from the GWP-GHG in earlier (pre v1.3) PCR 2019:14 versions. The "GWP-GHG (IPCC AR5)" indicator is determined using the IPCC AR5 GWPs with a 100-year time horizon (IPCC 2013). This indicator is aligned with Australia's greenhouse gas reporting frameworks.

Table 8: Legend for parameters describing resource use, waste and output flows

Parameter	Acronym	Unit
Parameters describing resource use		
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ_{NCV}
Use of renewable primary energy resources used as raw materials	PERM	MJ_{NCV}
Total use of renewable primary energy resources	PERT	MJ_{NCV}
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ_{NCV}
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ_{NCV}
Total use of non-renewable primary energy resources	PENRT	MJ_{NCV}
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ_{NCV}
Use of non-renewable secondary fuels	NRSF	MJ_{NCV}
Use of net fresh water	FW	m^3
Waste categories		
Hazardous waste disposed	HWD	kg
Non-Hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Output flows		
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy	EE	MJ

Table 9: Legend for EN 15804+A1 indicators

Indicator	Acronym	Unit
Global warming potential	GWP	kg CO_2 equivalent
Ozone layer depletion potential	ODP	kg CFC-11 equivalent
Acidification potential	AP	kg SO_2 equivalent
Eutrophication potential	EP	kg PO_4^{3-} equivalent
Photochemical oxidation (Photochemical ozone creation) potential	POCP	kg ethylene equivalent
Abiotic depletion potential - elements	ADPE	kg Sb equivalent
Abiotic depletion potential – fossil fuels	ADPF	MJ_{NCV}

Results, environmental profiles

The following section presents the results for each Life Cycle Assessment module. The results have been calculated (based on the EFv3.1 set of characterisation factors) with SimaPro software v9.6.0.1. To separate the use of primary energy into energy used as raw material and energy used as energy carrier, Option B from Annex 3 of PCR 2019:14 has been applied.
Water flows pertaining to Australian water use are disaggregated using the 36 water catchments for which characterisation factors are available for both Pfister Water Stress Index (WSI) and the Available WAter REmaining (AWARE) method. Characterisation factors are from Bontinck et al 2021.

Please consider the following mandatory statements when interpreting the results:
" The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks".

"The use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C is discouraged".

The environmental indicators are expressed per kg of DCP Cable Bolt

Table 10: Environmental indicators EN 15804+A2, Double Corrosion Protected Cable Bolt, per kg

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
Core indicators							
GWP-total	kg CO_2-eq.	3.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-01
GWP-fossil	kg CO_2-eq.	3.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-01
GWP-biogenic	kg CO_2-eq.	2.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-03
GWP-luluc	kg CO_2-eq.	6.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.92E-05
ODP	kg CFC11-eq.	3.64E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.95E-10
AP	mol H+ eq.	1.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-03
EP-freshwater	kg P eq.	1.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.37E-05
EP-marine	kg N eq.	2.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-04
EP-terrestrial	mol N eq.	3.20E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-03
POCP	kg NMVOC eq.	9.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-04
ADP minerals and metals[1]	kg Sb eq.	2.19E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-06
ADP fossil[1]	MJ (NCV)	2.84E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E+00
WDP[1]	m^3 world eq. deprived	1.36E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.57E-03

Additional indicators							
GWP-GHG	kg CO_2-eq.	3.23E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-01
PM	Disease incidence	2.45E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-08
IRP[2]	kBq U235 eq.	2.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-03
ETP-fw[1]	CTUe	6.29E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E+00
HTP-c[1]	CTUh	1.64E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-08
HTP-nc[1]	CTUh	2.45E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.01E-08
SQP[1]	-	8.49E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.82E-01
Carbon footprint							
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	**3.23**	**0**	**0**	**0**	**0**	**0.241**

Footnotes:

[1] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

[2] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

Table 11: Life cycle inventory parameters, Double Corrosion Protected Cable Bolt, per kg

Parameter	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
Parameters describing resource use							
PERE	MJ_{NCV}	3.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-01
PENRE	MJ_{NCV}	2.84E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E+00
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	2.84E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.86E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E+00
Environmental information describing waste and output flows							
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	4.32E-04	0.00E+00	0.00E+00	0.00E+00	1.00E+00	-3.60E-08
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.21E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 12: EN 15804+A1 indicators*, Double Corrosion Protected Cable Bolt, per kg

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
GWP	kg CO_2 eq	3.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-01
ODP	kg CFC11 eq	3.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-10
AP	kg SO_2 eq	1.13E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.70E-04
EP	kg PO_4^{3-} eq	2.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-06
POCP	kg C_2H_4 eq	1.45E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-04
ADPE	kg Sb eq	2.19E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-06
ADPF	MJ_{NCV}	2.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+00

* Note: the indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., the results of the “A1 indicators” shall not be claimed to be compliant with EN 15804:2012+A1:2013

Variation

The variation within the product group stays within ±10% for all core indicators, with GWP-total results varying less than ±3%.

Additional Information

Quality Assurance

Quality Assured to ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018

BUREAU VERITAS
Certification

Certification

Awarded to

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AUSTRALIA

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STANDARD

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SCOPE OF SUPPLY

PROVISION OF DESIGN, MANUFACTURE, SALES, WAREHOUSING AND SUPPLY OF STEEL STRATA CONTROL PRODUCTS FOR THE MINING AND TUNNELLING INDUSTRIES.

PROVISION OF SALES, WAREHOUSING AND SUPPLY OF PLASTIC AND CHEMICAL STRATA CONTROL PRODUCTS FOR THE MINING AND TUNNELLING INDUSTRIES.

Original Approval Date: 19 April 2018

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: 7 April 2027

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Further clarification regarding the scope of this certificate and the applicability of the Management System requirements may be obtained by consulting the organisation.

Certificate Number: AU005861-1

Andrew Mortimore
VP/CE CIP Pacific Region

Date: 5 April 2024

JAS-ANZ

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PROVISION OF SALES, WAREHOUSING AND SUPPLY OF PLASTIC AND CHEMICAL STRATA CONTROL PRODUCTS FOR THE MINING AND TUNNELLING INDUSTRIES.

Original Approval Date: 16 April 2018

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: 7 April 2027

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STANDARD

ISO 45001:2018

SCOPE OF SUPPLY

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PROVISION OF SALES, WAREHOUSING AND SUPPLY OF PLASTIC AND CHEMICAL STRATA CONTROL PRODUCTS FOR THE MINING AND TUNNELLING INDUSTRIES.

Original Approval Date: 8 May 2023

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: 7 April 2027

To check the validity of this certificate please call tel. 1800 855 190

Further clarification regarding the scope of this certificate and the applicability of the Management System requirements may be obtained by consulting the organisation.

Certificate Number: AU005863-1

Andrew Mortimore
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Date: 5 April 2024

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SANDVIK

Sandvik core values

Customer focus

We are agile, decentralized and make decisions close to customers

SANDVIK

Sandvik core values

Innovation

We are technology leaders, through innovation

SANDVIK

Sandvik core values

Fair play

We are ethical and compliant, dedicated to health, safety and sustainability

SANDVIK

Sandvik core values

Passion to win

We establish market leadership through empowered people, strong performance management and continuous improvements

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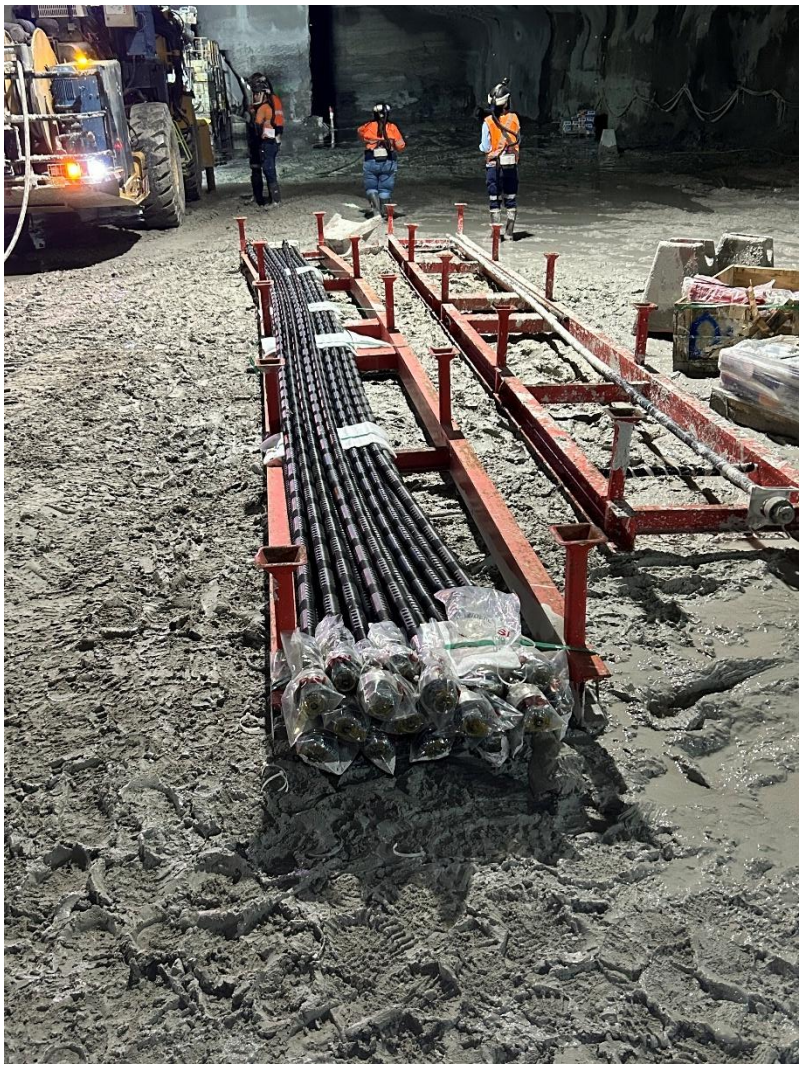

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