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Underground Scaler Selection & Site Assessment Guide

Understanding Scaling Tasks, Access Limits, and Model Selection Basics

What an Underground Scaler Does



Crawler-mounted underground scalers use hydraulic booms and breaker tools to remove loose, fractured, and unstable rock from mine roofs, sidewalls, and stope boundaries.

Typical Scaling Tasks

Scaling Task	Description
Roof Scaling	Remove loose rock from mine backs after blasting
Sidewall Scaling	Reach fractured rock along development drifts
Stope Boundary Work	Address unstable rock in difficult access areas
Floor Preparation	Support leveling and cleanup depending on model

Three Model Configurations

S11	Compact modular design for restricted underground transport routes
S21	Video-based remote operation with auxiliary breaker and bucket functions
S22	Multifunctional system for scaling, floor leveling, and secondary rock breaking

Selection Focus

- Underground access dimensions
- Working height and reach
- Rock conditions and loose block size
- Breaker capacity and hydraulic requirements
- Remote operation and auxiliary functions

Engineering Takeaway

Effective underground scaler selection starts with the work area, access route, and rock condition. The right model should match site clearance, required coverage, and the actual scaling tasks underground.

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Underground Scaling Requirements

Evaluating Work Areas, Geological Conditions, and Equipment Needs

Understanding Underground Scaling Requirements





Underground scaling requirements vary with excavation geometry, rock conditions, and mining methods. Loose rock may remain attached to mine roofs, sidewalls, or stope boundaries after drilling and blasting. The required scaling area and machine positioning conditions determine the working range and attachment configuration needed.

Before selecting an Underground Scaler, the actual work area, rock condition, and the type of material to be removed should be clearly identified.

Typical Scaling Work Areas

Work Area	Site Conditions	Assessment Focus
Mine Roof (Back)	Fractured or partially detached rock after blasting	Roof height and scaling coverage
Sidewalls	Loose rock along development drifts and access headings	Lateral reach and machine positioning
Stope Boundaries	Irregular rock surfaces and residual loose material	Remote access and working envelope
Floor Areas	Uneven surfaces and accumulated loose material	Floor leveling requirements
Oversized Rock	Detached blocks requiring further reduction	Secondary breaking requirements

Geological Conditions

Rock type, fracture distribution, joint spacing, and loose block characteristics affect both the scaling task and breaker response.

Excavation Geometry

Tunnel cross-section, roof height, sidewall profile, and available operating space determine whether the scaler can reach the required areas from a practical machine position.

Operating Sequence

Scaling work should be reviewed in relation to blasting, mucking, inspection, and ground-support activities so that the machine fits the actual underground work sequence.

Equipment Requirements

- Working attachment type
- Remote operation needs
- Floor leveling requirements
- Auxiliary material handling

Selection Reminder

An Underground Scaler should be selected according to the actual scaling task and mine operating conditions. Equipment suitability does not replace the mine's ground-control procedures or required ground-support measures.

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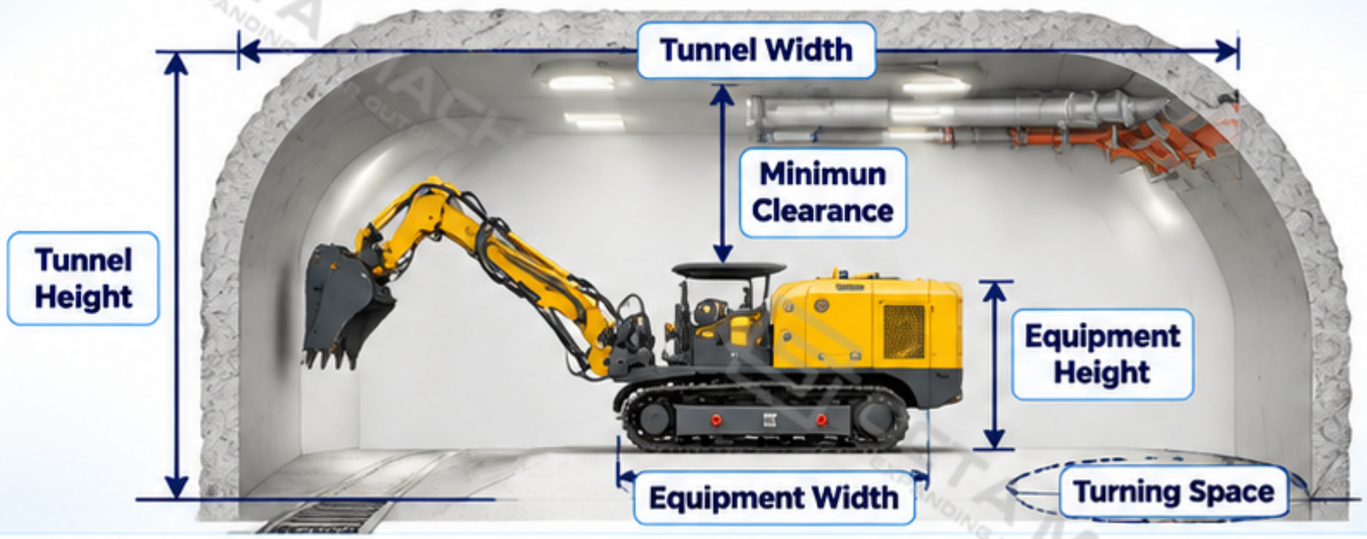
Underground Access & Transport Assessment

Checking Route Clearance, Machine Dimensions, and Transport Constraints

Underground transport conditions can impose stricter equipment limits than the actual working area. The machine must pass through the complete access route, including shaft cages, access drifts, narrow sections, and turning areas. Overall length, width, and height should be checked against the minimum available clearance along the route.

Underground Route Clearance



Reference Machine Dimensions

Model	Length (mm)	Width (mm)	Overall Height (mm)	Ground Clearance (mm)
S11	3510	800	1550	229
S21	7356	1600	2142	259
S22	4581	1600	2235	270

Reference dimensions are taken from the supplied product drawings. Confirm the final transport configuration and dimensional tolerances before project planning.



S11



S21



S22

Transport Route Assessment

Assessment Item	What to Check
Shaft and Cage	Internal dimensions and lifting capacity
Access Drift	Minimum clear width and height
Turning Areas	Available turning and maneuvering space
Ground Conditions	Floor level, rails, and surface obstructions
Ramp Sections	Actual gradient and traction conditions
Equipment Assembly	Module dimensions and lifting requirements

S11 Modular Transport Considerations



The S11 features a modular detachable structure. Where underground access is restricted, the transport plan should account for the dimensions, lifting requirements, and assembly space of each separated module.

Route Assessment Reminder — Assess the route at its narrowest and most restrictive sections—not only by the nominal dimensions of the main access tunnel.

Working Range & Hydraulic Breaker Requirements

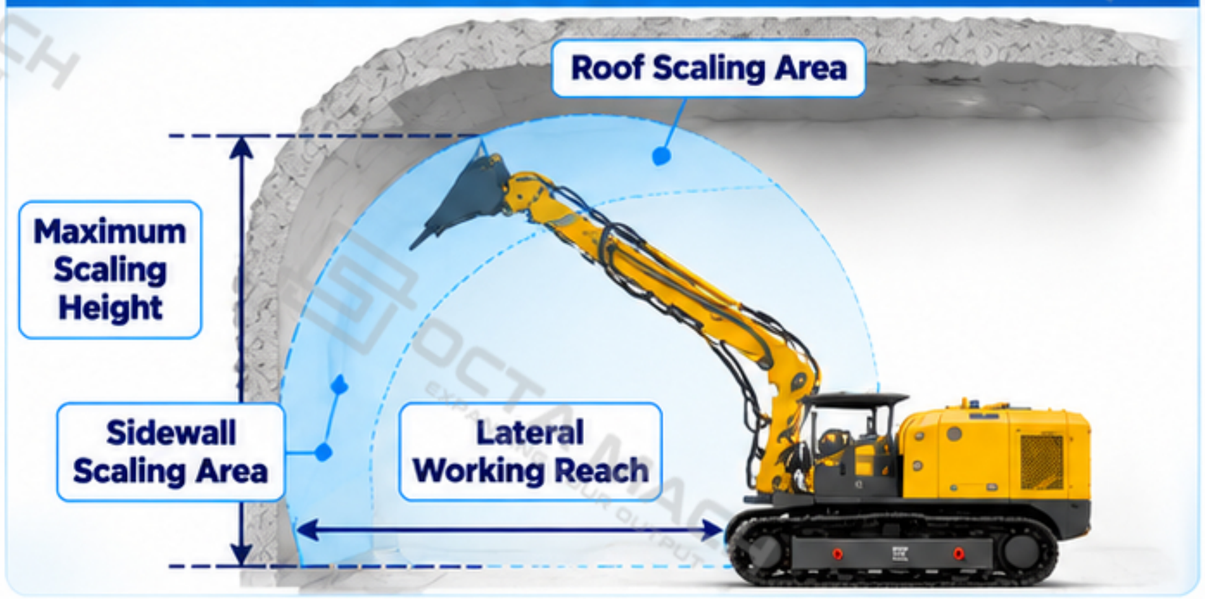
Matching Machine Reach, Breaker Capacity, and Rock Conditions

An Underground Scaler must reach the required roof and sidewall areas from a suitable operating position. The hydraulic breaker should be evaluated according to its impact characteristics and the geological conditions at the site, including rock hardness, chisel diameter, impact frequency, working pressure and hydraulic flow rate.

Underground Scaling in Operation



Working Range and Coverage



Key Working Range Factors

Parameter	Engineering Consideration
Scaling Height	Maximum height of the roof area to be treated
Lateral Reach	Distance required to reach sidewall surfaces
Boom Geometry	Attachment positioning and accessible working envelope
Machine Position	Setback distance and available operating space
Ground Conditions	Machine stability and access across uneven floors

Hydraulic Breaker Selection Factors

Parameter	Selection Consideration
Impact Energy	Ability to loosen and detach the target rock
Chisel Diameter	Tool configuration and contact area
Impact Frequency	Breaker operating characteristics
Working Pressure	Required hydraulic operating pressure
Hydraulic Flow	Compatibility between breaker and hydraulic system

Rock Conditions and Breaker Suitability



Fractured Rock



Jointed Rock



Massive / Hard Rock

- Rock hardness and strength
- Joint spacing and orientation
- Block size and degree of separation
- Corresponding breaker configuration and impact energy

Key Takeaway

Breaker selection and working range should be based on the actual rock conditions and scaling tasks, not on a single parameter such as rock hardness or impact energy.

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Selecting the Right Underground Scaler Model

Comparing Machine Configuration, Control, and Working Functions

The S11, S21 and S22 share the same basic hydraulic scaling process but differ in transport arrangement, control method and auxiliary functions. Model selection should reflect underground access restrictions and the work planned at the excavation site.

S11

Compact Modular Design



- Modular detachable structure
- Breaker and bucket
- Scaling and floor leveling

S21

Video-Based Remote Operation



- Video-based remote control
- Breaker and bucket
- Scaling and auxiliary ore handling

S22

Multifunctional Working System



- Multifunctional attachment system
- One-touch function switching
- Scaling, floor leveling and secondary rock breaking

Model Configuration Comparison

Selection Factor	S11	S21	S22
Machine Design	Modular detachable	Remote-operated	Multifunctional
Working Attachment	Breaker and bucket	Breaker and bucket	Multifunctional attachment
Control Arrangement	One-touch function switching	Video-based remote control	One-touch function switching
Main Tasks	Scaling and floor leveling	Scaling and auxiliary ore handling	Scaling, floor leveling and secondary rock breaking
Power Configuration	22 kW electric motor	103 kW diesel engine	Confirm against approved datasheet

Model Selection Guidance

S11

S11 — Restricted Underground Access

Consider where transport clearance is limited and a modular detachable arrangement is required.

S21

S21 — Remote Scaling and Auxiliary Handling

Consider where video-based remote operation and additional material-handling functions are required.

S22

S22 — Multiple Underground Preparation Tasks

Consider where scaling is combined with floor leveling and secondary rock breaking.

Quick Selection by Project Requirement

Restricted transport access → **S11**

Video-based remote scaling / auxiliary ore handling → **S21**

Scaling + floor leveling + secondary rock breaking → **S22**

Final selection depends on verified machine specifications and actual project conditions. The supplied S22 brochure performance table is headed S21; confirm S22 power and performance figures against the corrected, approved S22 technical datasheet before publication.

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Underground Scaler Site Assessment Checklist

A Practical Project Information Sheet for S11, S21 and S22 Configuration Review



Accurate project information helps determine whether an Underground Scaler can access the working area, reach the required surfaces and perform the specified tasks. Complete this checklist using available mine drawings, site measurements and operating information. If a detail is not yet available, mark it as 'To Be Confirmed'.

2. Project Information

Assessment Item	Project Information
Project / Mine Name	_____
Country / Location	_____
Mine Type	Metal / Non-metal / Other
Excavation Type	Mine Drift / Stope / Tunnel
Main Scaling Area	Roof / Sidewall / Stope Boundary

3. Underground Access Conditions

Assessment Item	Required Information
Tunnel Width	_____ mm
Tunnel Height	_____ mm
Minimum Access Width	_____ mm
Minimum Access Height	_____ mm
Shaft / Cage Dimensions	_____ mm
Maximum Route Gradient	_____ °
Turning Space	_____
Floor Conditions	Level / Uneven / Rail-mounted

4. Working Requirements

Assessment Item	Required Information
Required Scaling Height	_____ mm
Required Lateral Reach	_____ mm
Rock Type	_____
Rock Fracture Conditions	_____
Loose Block Size	_____
Main Working Tasks	Scaling / Floor Leveling / Secondary Breaking
Auxiliary Ore Handling	Required / Not Required
Remote Operation	Required / Not Required

5. Power and Operating Conditions

Assessment Item	Required Information
Available Power Supply	Electric / Diesel
Rated Voltage	_____ V
Frequency	_____ Hz
Available Electrical Capacity	_____ kW
Underground Ventilation Conditions	_____
Special Operating Requirements	_____

6. Supporting Project Documents

- ☐ Mine layout and tunnel cross-section drawings
- ☐ Underground transport route drawings
- ☐ Site photographs
- ☐ Rock condition or geological information
- ☐ Required working area drawings
- ☐ Special equipment configuration requirements

7. Final Submission

Request an Underground Scaler Configuration Review

Submit the completed site assessment checklist together with available mine drawings, access-route dimensions and site photographs.

OCTA MACH can review the project requirements to identify a suitable S11, S21 or S22 configuration and clarify the technical details requiring confirmation.

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Underground Mining and Tunneling Equipment