

ROOF - RIB - PILLAR WRAP - LONGWALL RECOVERY

URRF

Underground Roof & Rib Reinforcement Installation and QA guide

Planning, mechanical handling, controlled deployment, orientation, support capture, longwall recovery, inspection and field records for coated PET URRF.

SUPPORTED POSITION

Install only inside the mine's approved temporary and permanent support envelope.

MECHANICAL HANDLING

Published full-roll masses range from approximately 378 to 1,222 kg.

SUPPORT PLAN

Grade, direction, bolts, plates, straps, overlaps and terminations are released together.

Guide contents

- 02 Product, system boundary and roles
- 03 Support design and released drawing
- 04 Delivery, roll mass and handling
- 05 General installation sequence

- 06 Orientation, joints and repair
- 07 Longwall and recovery method
- 08 Inspection, TARP and field ITP
- 09 Field record and references

SYSTEM INSTALLATION

Use with the mine's approved support drawing, strata-control plan, plant procedure, risk assessment and TARP.

01 / PRODUCT AND ROLES

Know the material before the roll moves

URRF is a high-tenacity PET yarn reinforcement arranged in warp and weft and finished with a flame-resistant, anti-static polymer coating. The coating binds and protects the yarn bundles and is a functional part of the roof and rib reinforcement system.



WARP AND WEFT PET YARN CONSTRUCTION

CORE

High-tenacity PET yarn

Continuous polyester filaments form tensile bundles in both declared grid directions.

COATING

Flame-resistant and anti-static

The applied polymer coating delivers the published coal-mine functionality.

SYSTEM BOUNDARY

The grid forms a continuous surface membrane. Bolts, cables, plates, straps and standing support form the mine's primary strata-control system.

Responsible roles

Role	Installation responsibility
Mine geotechnical / strata-control engineer	Design and release the grade, direction, bolt and cable pattern, plates, straps, joints, terminations, repairs, monitoring and TARP.
Mine materials / electrical authority	Accept fire and anti-static evidence, batch traceability and any change to the material formulation or manufacturing process.
Installation supervisor	Confirm the current drawing, ground condition, competent crew, plant, exclusion zones, roll identity and inspection points.
Bolter / installation crew	Work inside the supported envelope, maintain orientation and alignment, install to the released pattern and report damage.
QA / technical representative	Verify roll and batch records, spacing, plates and straps, joints, repairs, photographs and close-out.

02 / SUPPORT DESIGN AND DRAWING

Design the load path, then issue one controlled detail

Bolt and mesh spacing is developed by the mine geotechnical or strata-control engineer. Rock size and roadway width matter, but grade selection also depends on failure mechanism, clear span, retained load, deformation and support interaction.

Design input	What it establishes	Effect on the support detail
Ground model	Lithology, bedding, cleat and joints, weak bands, water, stress and dynamic potential.	Failure mechanism, block geometry, demand and expected change.
Excavation	Width, height, profile, intersection geometry, orientation and exposure period.	Exposed area, stress redistribution, support access and deformation.
Retained material	Block dimensions, density and fine-fragment distribution.	Aperture retention, local membrane load, plate interaction and sag.
Support geometry	Bolt rows and spacing, anchorage, plates, straps, cables and pretension.	Clear membrane span, capture points and load distribution.
Serviceability	Allowable sag and convergence, equipment, egress and re-entry thresholds.	Usable response before ultimate tensile capacity is reached.
Operating method	Bolter or longwall plant, dispenser, work zone, ventilation and services.	Roll format, direction, joints, exposure length and deployment.

Released support drawing - minimum content

- Mine, seam, district, roadway, chainage, design ground condition and applicable support TARP.
- URRF grade and warp direction; roof and rib coverage; start, stop and transition points.
- Bolt or cable type, length and spacing; plate or strap geometry; pretension and installation sequence.
- Dimensioned overlap, common support row, edge termination, service penetration and repair details.
- Maximum temporarily supported advance, roll-exposure limit and completed-increment inspection point.

DESIGN OWNERSHIP

The mine's geotechnical or strata-control engineer releases the support package; product data does not set bolt spacing.

CHANGE CONTROL

Changes to grade, direction, bolt pattern, plate, strap, overlap, plant or ground condition return to the support-design process.

03 / DELIVERY AND HANDLING

Treat every roll as a heavy engineered load

Use the shipping mass and roll-core dimensions for the final lifting plan. Published dimensions give the following planning masses.

Grade	Nominal roll	Area	Approx. mass	Handling basis
URRF-60/60	5 x 104 m	520 m ²	378 kg	Mechanical handling
URRF-100/80	5 x 104 m	520 m ²	499 kg	Mechanical handling
URRF-200/200	5 x 104 m	520 m ²	972 kg	Mechanical handling
URRF-400/400	5 x 52 m	260 m ²	772 kg	Mechanical handling
URRF-600/400	5 x 52 m	260 m ²	923 kg	Mechanical handling
URRF-800/800	5 x 52 m	260 m ²	1,222 kg	Mechanical handling

Handling controls

Stage	Required control
Delivery and quarantine	Verify grade, roll ID, batch, certificate and accepted fire and anti-static record. Inspect wrapping, core, roll edges, coating, yarn bundles and junctions for damage or contamination.
Storage	Store on firm level dunnage in a secured area. Restrain against rolling and impact; protect from traffic, sharp edges, welding, flame, oils, chemicals and prolonged weather.
Lifting and dispensing	Use a rated shaft, lifting beam, cradle and controlled dispenser for the full roll, core and dynamic effects. Establish exclusion zones and control rotation and overrun mechanically.
Personnel and product	Never manually support or brake a suspended roll. Keep people clear of run-away and pinch zones, and keep forks, chains and sharp hardware clear of the grid.

PLANNING MASS

Use the actual shipping record for equipment selection and record damaged or missing roll identity before release underground.

04 / GENERAL INSTALLATION

Advance the membrane inside the supported envelope

The mine's temporary-support rules and bolting process govern every step. The roll-dispenser layout must keep people clear of unsupported ground, suspended loads and pinch or run-away zones.

Step	Action	Acceptance point
01	Barricade and position the bolter or installation plant inside the approved supported zone.	No person or plant component enters unsupported ground.
02	Scale loose material progressively and reassess visible roof and rib against the support TARP.	Ground remains within the released support basis.
03	Load the verified roll mechanically; secure the shaft and dispenser; confirm roll ID and direction marks.	Core, shaft, brake, restraints and orientation are correct.
04	Secure the leading edge at the nominated start row with the specified plates or straps.	Leading edge is captured and roll movement is controlled.
05	Unroll only the permitted length; maintain alignment and controlled presentation.	No twist, snag, free edge or local overstress.
06	Install bolts, plates and straps in the released pattern; complete coverage, joints and terminations.	Spacing, seating, pretension and coverage match the drawing.
07	Inspect, photograph and record the completed increment before advance.	Defects are repaired or controlled and the increment is signed off.

COLD CUTTING

Use the mine-approved cold-cutting method. Control free edges and offcuts so they cannot whip, snag, fall onto plant or create trip and entanglement hazards.

PRESTART

Confirm current drawing, ground and TARP condition, gas and ventilation controls, competent crew, dispenser, exclusion zones, components, communications and emergency response.

COMPLETED INCREMENT

Do not advance until orientation, support spacing, plates and straps, joints, edges, damage, repairs, photographs and ground condition have been accepted.

05 / DETAILS AND REPAIR

Every discontinuity is a support detail

Orientation, overlap, edge termination, service penetrations and repairs must preserve an explicit load path to intact support points.

01 - ORIENTATION

Mark warp and weft

For URRF-100/80 and URRF-600/400, align the stronger first-value warp with the released drawing. Confirm from the roll label and direction mark.

02 - JOINTS

Capture across a support row

Use the dimensioned overlap and plate or strap detail. Do not use an unsupported butt joint; ties and clips do not replace structural capture.

03 - EDGES AND CUT-OUTS

Terminate and frame

Finish at an approved support row. Frame services and cut-outs with specified support, maintain clearances and prevent snagging free edges.

04 - REPAIR

Reconnect to intact supports

Assess ground and load first. Patches use the nominated grade and extend to intact support points. Damage in a joint or recovery zone returns to the designer.

Damage response

Observed condition	Immediate response	Technical response
Cut or torn yarn; failed junction	Control the area and inspect adjacent support.	Assess the remaining load path and repair to intact supports.
Plate pull-through or open edge	Restrict access under the mine TARP.	Review plate or strap detail, span and retained load.
Heat, melt, charring or coating damage	Treat affected material as unserviceable.	Replace to the approved repair detail and record the incident.
Progressive sag or repeated damage	Monitor, barricade or withdraw as required.	Review demand, equipment contact, installation and support design.

LOADED MEMBRANE

Do not cut, release or repair grid carrying detached material until the ground and support system are controlled by an engineered method.

06 / LONGWALL AND RECOVERY

A moving face, advancing shields and a controlled goaf

A shearer cuts across a long coal face and loads coal to an armoured face conveyor. Hydraulic shields protect the active work zone, advance with the face and allow the roof to cave into the goaf behind.

01 - CUT AND CONVEY

Shearer and AFC

The shearer extracts coal across the face; the armoured face conveyor carries it to the gate roadway.

02 - SUPPORT AND ADVANCE

Hydraulic shields

Shields carry the immediate roof above the active zone, then advance as the roof behind caves into the goaf.

Where recovery grid fits

Near the planned finish, recovery grid can be introduced across the face and carried over the shield canopies. The continuous reinforced screen helps control immediate roof and limits broken material flushing into the work area while shields are recovered.

Recovery method - minimum content

- Face and stopping plan: panel geometry, chainage, installation start, stopping line, advance rate and shield sequence.
- Geotechnical basis: immediate roof, weighting history, abutment stress, convergence, cavities, water and expected support transfer.
- Grid system: grade, direction, layers, overlaps, attachment, edge anchorage, damage criteria and repair method.
- Equipment and people: shearer, AFC, shields, canopies, hoses, services, visibility, supported access, exclusion zones and escape route.
- Monitoring and TARP: roof condition, shield load, convergence, grid damage, gas and ventilation, escalation, withdrawal and stop criteria.

R1

Design release

Approve the recovery support design, grade, direction, roll format and handling system.

R2

Method release

Verify plant changes, risk controls, gas controls, zones and competencies.

R3

Increment release

Accept face condition, attachment, overlaps, damage and monitoring before advance.

DESIGN OWNER

Mine geotechnical and longwall engineering teams define the recovery chainage, sequence and acceptance points.

07 / INSPECTION AND ITP

Inspect the membrane, the ground and the records

Grid can remain visually intact while carrying detached material. Inspection therefore covers ground condition, support response, membrane displacement, damage history and traceability.

Stage	Observe	Response
Completed increment	Roll and batch, direction, spacing, plates and straps, joints, edges, sag, cuts, coating and photographs.	Repair or control defects before advance.
Routine roadway	New sag, loose-material loading, plate distortion, pull-through, tears, water and machinery contact.	Record condition and apply the mine TARP.
After convergence or weighting	Profile change, displacement, support loading, edge movement, joint separation and ground deterioration.	Restrict access at triggers and obtain technical review.
After impact, heat or chemical exposure	Visible and hidden damage, load path, adjacent ground, melting, shrinkage, charring and coating change.	Barricade, investigate and repair or replace to the approved method.

Installation inspection and test plan

Point	Characteristic	Acceptance record
HP-01	Support design and product release	Current drawing, grade, direction, support detail, method, risk assessment and competence.
HP-02	Delivery and roll identity	Correct roll and batch, certificate, accepted material record and no unacceptable damage.
W-01	Handling equipment	Rated shaft, cradle and dispenser; inspections current; restraints and exclusion zones.
HP-03	Ground and prestart	Supported position; ground within TARP; gas and ventilation controls; correct components.
W-02	Orientation and support installation	Warp correct; grid aligned; bolts, plates, straps, joints and snugness match drawing.
HP-04	Completed increment	No unaccepted defect; repairs recorded; ground and access condition accepted.

08 / FIELD RECORD

Close the loop from roll to installed support

Complete one record for each nominated installation increment or recovery stage and link photographs, support records, TARP actions and nonconformance close-out.

Field	Project record
Mine / seam / district / roadway / chainage	
Date / shift / supervisor / installation crew	
URRF grade / warp direction / roll ID / batch ID	
Certificate and material-acceptance reference	
Bolt, cable, plate and strap detail / spacing	
Overlap, termination and penetration details	
Ground condition and support TARP status	
Damage, repair and nonconformance reference	
Photograph / monitoring / inspection references	
Completed increment accepted by / date	

TARP triggers

Define actions for increased sag or convergence, plate pull-through, broken yarn or junction, open joint, free edge, loss of anchorage, abnormal water or weighting, heat or flame exposure and missing product traceability.

Technical references

- NSW Resources Regulator, Code of Practice: Strata control in underground coal mines, February 2015.
- NSW Resources Regulator, TRG 3608 Non-metallic materials for underground coal mines and reclaim tunnels, 2022.
- NSW Resources Regulator, Technical Reference Guide: Strata support bolting plant in underground coal mines, 2024.
- NIOSH, Evaluation of Support and Ground Response as Longwall Face Advances into and Widens Recovery Room, 2007.
- Supplied URRF technical schedule: coated PET roof and rib grades; ASTM D6637, ASTM D5261 and MT141-2005 reported basis.

Revision R05 - 25 August 2026