Laminated GCL product range

Unmodified granules or polymer modified powder | Standard or Heavy Duty | Two film options

Kontain HDL-GCL is specified in sixteen combinations. Four base constructions are available with sodium bentonite granules without polymer addition (U) or polymer-modified sodium bentonite powder (P) and either film thickness. Standard grades use a woven carrier; Heavy Duty grades add a nonwoven to form a composite carrier. The numbers 37 and 40 identify minimum dry bentonite loadings of 3,700 and 4,000 g/m².

Specified supply requirements. Exact grade confirmation and traceable production verification are required before supply. These values are not certified results for each finished laminate.

Grade	Dry bentonite min g/m²	Carrier min g/m²	0.20 mm codes U / P	0.50 mm codes U / P
Standard 37	3,700	100	S37U-020 / S37P-020	S37U-050 / S37P-050
Standard 40	4,000	100	S40U-020 / S40P-020	S40U-050 / S40P-050
Heavy Duty 37	3,700	300	H37U-020 / H37P-020	H37U-050 / H37P-050
Heavy Duty 40	4,000	300	H40U-020 / H40P-020	H40U-050 / H40P-050

All grades: cover nonwoven ≥200 g/m² and carrier woven ≥100 g/m². Heavy Duty grades add carrier nonwoven ≥200 g/m², giving composite carrier ≥300 g/m². U identifies sodium bentonite granules without polymer addition; P identifies polymer modification.

Mechanical requirements

Property	Method	Standard grades	Heavy Duty grades
Tensile MD / CMD	ASTM D6768	≥10 / ≥10 kN/m	≥10 / ≥10 kN/m
Internal GCL peel	ASTM D6496	≥360 N/m	≥360 N/m
CBR puncture	EN ISO 12236	≥1,600 N	≥2,500 N
Hydrated peak internal shear at 10 kPa normal stress	ASTM D6243	≥30 kPa	≥35 kPa
PE to cover peel in bonded areas	Agreed PE/nonwoven peel procedure	≥300 N/m	≥300 N/m

Film selection

020: 0.20 mm nominal LDPE; no extrusion sealing. 050: 0.50 mm nominal LDPE; manufacturing and extrusion procedure qualification are required. Neither option is wedge weldable. Film resin and nominal thickness are specified; GM13/GM17 compliance is not declared.

Bentonite and hydraulic requirements

Property	Specified value	Method or reporting basis
Bentonite formulation	U: unmodified granules P: polymer-modified powder	Controlled formulation and lot traceability
P powder grading	P only: ≥80% passing 75 µm	Sieve or validated particle-size method
Moisture content	≤13%	ASTM D5993; stated reporting basis
Fluid loss	U Standard ≤18 mL U Heavy Duty ≤16 mL P all grades ≤18 mL	U: ASTM D5891 within scope. P: D5891-based modified procedure; confirm preparation.
U swell in reagent water	≥24 mL/2 g	ASTM D5890; minimum 16 h; note 1
P swell in reagent water	≥28 mL/2 g at 16 h	D5890-based modified procedure; note 1
P swell in saline liquid	≥22 mL/2 g at 16 h	20,000 mg/L NaCl; modified procedure; note 1

Core hydraulic property	Standard 37 and 40	Heavy Duty 37 and 40
Conductivity in fresh water max m/s	5.0×10^{-11}	3.0×10^{-11}
Conductivity in 20,000 mg/L NaCl max m/s	P: 1.0×10^{-10} U: not declared	P: 1.0×10^{-10} U: not declared
Fresh-water index flux q10 max $m^3/m^2/s$	2.7×10^{-9}	2.7×10^{-9}

1 Swell methods. U grades: ASTM D5890 in reagent water, with a minimum 16 h hydration period after the final clay increment; extend and report readings as required by the method. P grades: D5890-based modified procedure, reporting at 16 h after the final increment in reagent water or 20,000 mg/L NaCl. Reagent water is distilled or deionised water meeting ASTM D1193. D5890-25 excludes polymer-containing clays, so P results are reported as modified tests.

Supplier reference values for modified bentonite are ≥28 mL/2 g in tap water and ≥22 mL/2 g in unspecified 20,000 ppm salt water. The defined reagent-water, NaCl and 16 h conditions are acceptance requirements needing supplier confirmation. U-grade saline swell and saline conductivity are not declared.

2 Hydraulic assessment. Hydraulic values apply to the geotextile-backed GCL core, not the PE film or the completed joint. Confirm confinement, hydraulic gradient, hydration sequence, permeant composition and equilibrium criteria in the order test schedule. The AS catalogue lists D5887 beside conductivity; D5887 measures index flux. Report conductivity using D5084 with an agreed GCL setup; use D6766 within scope for chemical permeation and identify any adaptations. Assess the film-backed assembly separately. The Standard-grade fresh-water index flux limit is adopted from Heavy Duty on a same-bentonite assumption and requires ASTM D5887 verification; construction and confinement also affect hydraulic behaviour.

3 Value basis. Lower-bound properties are specified minima; conductivity, flux, fluid loss and moisture are upper limits. Film thickness is nominal. No statistically established roll-value declaration is made. The 360 N/m internal peel, D6768 tensile and construction-specific properties require verification on the selected construction. No performance increase is assumed solely from increasing bentonite mass.

4 Formulation selection. Consider polymer modification where higher resistance to drying and desiccation cracking is sought during extended exposure before covering, or where lime-affected water, highly saline water or certain leachates may hydrate the bentonite instead of typical rainwater. Select and verify the polymer formulation against the actual hydration liquid, pH, dissolved ions, confinement and exposure conditions. Polymer modification does not automatically qualify lime-treated fill or aggressive liquids. Cover promptly; permanent exposed service requires a separate design. Landfill-specification compliance is not declared. Additional chemical, cycling and protection qualification remains pending for the exact grades.

Selection and installation

Unmodified bentonite is available for projects where typical low-salinity rainwater or compatible subgrade moisture hydrates the clay, subject to the project chemistry, confinement and hydraulic requirements. Consider polymer modification where higher resistance to drying and desiccation cracking is sought during extended exposure before covering, or where lime-affected water, highly saline water or certain leachates may hydrate the bentonite instead of typical rainwater. Select and verify the polymer formulation against the actual hydration liquid, pH, dissolved ions, confinement and exposure conditions. Polymer modification does not automatically qualify lime-treated fill or aggressive liquids. Cover promptly; permanent exposed service requires a separate design.

Use hydrated internal and interface shear results for the actual lining system. Peak internal shear values in this guide are index acceptance requirements; they are not residual design strengths or interface-friction parameters. Verify puncture protection for actual aggregate grading, angularity, load and placement method.

Maintain at least 300 mm direct GCL contact beneath a separate 300 mm PE overlap at designated longitudinal joints. A 400 mm released film zone is specified at those edges. Roll ends and field cuts require an issued detail and cannot be inferred from the longitudinal release.

Unsealed film laps rely on the underlying GCL seal. Cover promptly and maintain compatible confinement. Keep plant off uncovered GCL. Confirm membrane integrity, seams, repairs and penetrations in the project quality plan.

Evidence and manufacturing control

Revision M supersedes Revision L. U and P distinguish unmodified and polymer-modified formulations. Previous named codes identified polymer modification and must not be reused for unmodified supply. Confirm the complete new code on the order.

Retain bentonite source, formulation, active polymer dose, geotextile components, adhesive, film grade, production lot and roll identifiers. Confirm sampling, test conditions and acceptance limits in the order. A change of source or formulation requires review of the affected properties.

Additional qualification programme

Planned work includes calcium and saline chemical permeation, standard and chemically conditioned wet-dry and freeze-thaw cycling, hydraulic recovery, polymer retention, subgrade-only rehydration beneath intact PE and finished-assembly protection. These are development activities. No achieved cycle rating, service life, calcium-swell result or finished-product superiority is declared.

Source basis

Sanderay GCL product brochure supplied 5 November 2026: AS and RNP schedules. ASTM method scopes and laboratory-agreed adaptations govern reporting.

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