Technical Notes

PipeDefender® Overview

PipeSak® Pipeline Protection

PipeDefender® engineered pipeline lagging (EPL) is a heavy-duty rock protection system used for extreme pipeline protection - replacing wood lagging and thin concrete coating.

- Simple, quick and safe to install
- Increase pipeline integrity
- Reduce on-site crushing and hauling
- Third-party CP tested and approved

Industry-leading impact performance

Made from high-impact strength polyethylene, PipeDefender® engineered pipeline lagging has been performance tested to ASTMG14 and custom rock drop tests to simulate worst-case impacts involving large rocks and angular, dense backfill.

The design incorporates a pattern of peaks and valleys, engineered to not only disperse the force of impact, but also absorb it through deformation. PipeDefender® engineered pipeline lagging can protect coatings from 60lb (27 kg) rock impacts dropped from 6.5' (2 m) for NPS20-60 pipe, and 20 lb (9 kg) impacts dropped from 6.5' (2 m) for NPS4-16.

Reduce or eliminate bedding costs

With the pipe fully protected, imported or screened sand is no longer needed to pad or bed the pipeline. PipeSak® recommends a 2" (51 mm) minus bedding for 4-16" pipe, and 3" (76 mm) minus bedding for 20-60" pipe. Backfilling requirements can be conservatively broadened to include 12" (305 mm) rock dropped from 6.5' (2 m)[1] for NPS20-60, and 8" (203 mm) rock dropped from 6.5' (2 m)[2] for smaller diameters.

[1] Rock of 12" (305 mm) in largest dimension, under 60 lb. (27 kg) in weight
[2] Rock of 8" (203 mm) in largest dimension, under 20 lb. (9 kg) in weight

PipeDefender® General Specifications

Pipe Size Availability	NPS4 - 60
Panel Dimensions*	L x W x H
NPS4-12	37.5" x 45" x 1" (95 x 114 x 2.5 cm)
NPS16	37.5" x56.7" x 1" (95x 144 x 2.5 cm)
NPS20-60	50" x 42" x 2.25" (127 x 107 x 6 cm)
Material	UHMWPE

*Smaller panels available to accommodate NPS20, 30 & 42 pipelines. NPS4-10 panels trimmed from PD12 panel.

Quick, easy, and safe - Install 1ft/minute

PipeDefender® engineered pipeline lagging is easy-to-handle, can be installed quickly with no installation equipment, and only requires two workers to install with provided custom fasteners. The modular design of the panels accommodates all pipeline sizes 4" and larger. PipeDefender® engineered pipeline lagging can even be field trimmed to better accommodate tight bends.

Does not impede cathodic protection

The patented design of PipeDefender® engineered pipeline lagging incorporates multi-channel drainage, allowing groundwater an easy path to and away from the pipe. The free-flowing water ensures that resistivity levels remain within the typical variations found in soils and prevents water from pooling against the pipe surface.

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PipeDefender® Specifications

Physical Property Data		PipeDefender®	PipeDefender® SD
Property	Equivalent Test Method	Typical Test Result[1]	Typical Test Result[1]
Impact Strength	ASTM G14 (modified)[2]	>7,300 in-lbs [826 j]	>7,300 in-lbs [826 j]
Impact Strength (Rock Drop)	Custom[3]	9,000 in-lbs [1016 j]	3,800 in-lbs [430 j]
Compressive Strength	Custom[4]	93 psi @ 50% strain [0.64 MPa]	433 psi @ 29% strain [2.99 MPa]
Tensile Strength	ASTM D638	3,400 psi [23.44 MPa]	3,400 psi [23.44 MPa]
Elongation at Break	ASTM D638	450%	450%
Flexural Modulus	ASTM D790	150,000 psi [1,034 MPa]	150,000 psi [1,034 MPa]
Low Temperature Brittleness	ASTM D746	-76°F [- 60°C]	-76°F [- 60°C]
Melt Flow	ASTM D1238	13.5 g/10 minutes	13.5 g/10 minutes
Specific Gravity	ASTM D1505	0.960	0.960
Cathodic Protection	Custom	No inhibiting effect	No inhibiting effect
Wrap Test	Custom at -58°F [-50°C]	Fully wrapped around 36” (914 mm) OD pipe	Fully wrapped around 12.75” (324 mm) OD pipe
Leach Test	EPA Method 8270E	Detection limits not Exceed	Detection limits not Exceed

1 Testing results are average values and should not be taken as a guarantee of performance.
2 Modified test included a 2" (51 mm) tup dropped in the center of a rib.
3 Test involved dropping rocks up to 78lbs (35 kg) from 9.8 ft (3 m) at -58˚F (-50˚C), room temperature and 122˚F (50˚C) on one or more PipeDefender® ribs covering an FBE coated pipe.
4 PipeDefender® SD prevented damage from an equivalent rock impact of a 32lb. (14.6 kg) rock dropped from 3 m (9.8’) onto an FBE coated pipe in both -40˚F (-40˚C) and room temperature tests. Damage to coating evaluated as per ASTM G62. Successfully passed ASTM G13M.
5 Three ribs of PipeDefender® and six ribs of PipeDefender® SD compressed at a constant rate to identify compressive behavior. Stress taken at the surface of PipeDefender®.