DENAIS® Wearable Products
— Super Oil Sand Rubber(SOSR) Lined Steel Pipes & Spools

THE DENAIS® SOSR PROVIDES UNMATCHED WEAR PERFORMANCE IN THE TOUGHEST ABRASION ENVIRONMENTS.

DENAIS® SOSR: A high performance rubber compound designed to provide resistance to oils, wet abrasion and elevated temperatures, which is specially designed to meet the rigorous demands of the oil sands industry.

It exhibits outstanding strength, resilience, and resistance to cutting and tearing, giving superior performance in wet abrasion conditions. Our sustained performance advantage in the rubber industry lies in our well-proven manufacturing process, which creates a product that provides superior performance when compared to other wear materials. DENAIS® SOSR is extremely strong, tough and resilient. When this is combined with the excellent tear, cut and abrasion resistance, our rubber products are irreplaceable in abrasion trouble spots. By using the highest quality raw material, combined with our professional manufacturing process, we deliver reduced operational down time and lower total ownership costs.

The DENAIS® SOSR is extremely versatile and suitable as protective lining for a variety of surfaces to minimize wear and corrosion of the base structure. Even it is specially designed for the rigorous oil sand application, the excellent properties of SOSR make it suitable for many other applications. Typical lining applications include:

- Chute lining
- Pipe lining
- Vessel lining
- Hose construction

In addition to its versatility, DENAIS® SOSR products are lighter and more flexible than other wear liner materials such as steel and ceramics. This aids with installation and maintenance. Both our cured and uncured rubber products can be manufactured with varying thicknesses.

DENAIS SOSR design features:

- Outstanding abrasion resistance
- Oil resistant
- Chemical resistant
- Weather resistant
- Ageing resistant
- Excellent rebound resilience

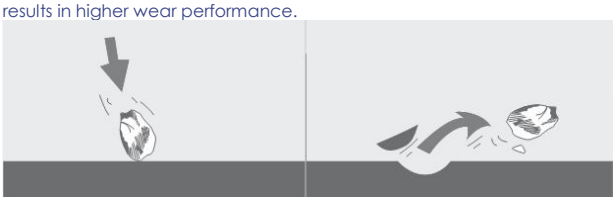
*HOW TO SELECT THE APPROPRIATE RUBBER?

To select the most appropriate compound for an application, many factors need to be taken into account. Understanding the following factors is critical to making the right selection:

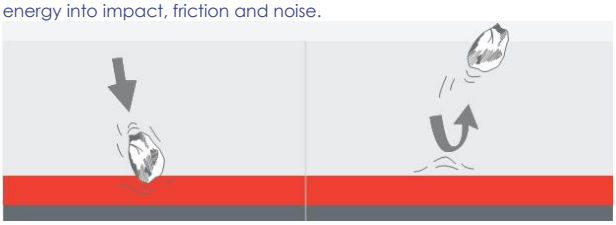
Particle Size and Weight

In order to achieve the best possible operating economy and the longest service life, it is usual to increase rubber thickness within certain limits to cope with larger and heavier particles.
Impact of particles from increasing height also requires increased rubber thickness to absorb compressive forces.
As the particle hits the surface, the rubber deforms, absorbing the kinetic energy of the particle. The resilient nature of rubber returns most of this energy to the particle, causing it to rebound. There will be little or no wear and no permanent deformation.
However, if the particle momentum is too great relative to the rubber thickness, the impact force cannot be absorbed and the rubber may cut or tear.

The diagram demonstrates the reason rubber outperforms steel in many abrasive environments. It is the ability of the rubber to absorb an impact and then return the energy from the impact back to the particle that results in higher wear performance.



Abrasive particle striking non-elastic metal surface. Conversion of kinetic energy into impact, friction and noise.



Abrasive particle striking resilient rubber surface. Rubber deforms under load and returns most of kinetic energy to the particle without rate of wear experienced above.

Velocity

In impact and sliding abrasion situations there is a critical speed above which elastomers are unable to recover and absorb energy. In this case, the product's resilience cannot be used to its full extent and the surface may deteriorate more rapidly.

Angle of Impact and Sliding Wear

The angle of impact of the particle relative to the wear surface is of great importance in designing chutes, hoppers

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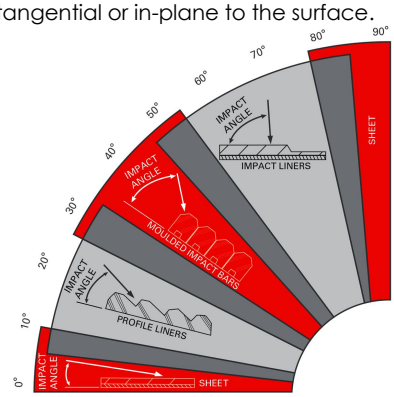
and rubber linings in general. The effect of different angles on wear rate can be significant.
At 90° impact angle, resilience is the major factor in resisting wear, but as the impact angle reduces to around 50°, tear resistance becomes more important. At very low impact angles, slurries are best handled by flat surface. This applies to pulley lagging and applications involving general sliding wear, where the abrasive force is tangential or in-plane to the surface.



Selection Criteria for Impact Angle and Sliding Wear

Rubber Hardness and Physical Properties
In broad terms, harder rubbers are preferred for combating high impact/cutting forces that often occur when handling coarse materials. DENAIS® SOSR rubber gives excellent results when used in abrasive slurry service or sliding abrasion where fine to medium particles are being handled.
Other physical properties can often play a significant role in optimising performance. For example, good resilience is required when screening sticky materials. Rubber elongation is the important factor in the design of fabricated seals and bellows. The key to specifying the correct rubber is in selecting the best combination of properties to suit the application.

Temperature
The temperature of the application in which the rubber will be used is important. The temperature limits of DENAIS® SOSR can be used in applications where temperatures reach 100°C/212°F.
It is also important to take into account the temperature limits of the adhesive system being used if rubber lining is taking place. Most rubber adhesive systems are limited to temperatures up to 90°C/194°F.

Chemical Environment
Different rubber compounds exhibit varying degrees of resistance to chemicals. Natural rubber, for example, is unsuitable for use in contact with hydrocarbons. In this situation, DENAIS® SOSR is more suited.
We offer a range of rubber materials that maximise potential applications in chemical environments.
The chemical composition of the slurry or application should always be verified to confirm that the rubber being selected is suitable.

Noise and Vibration
Occupational health and safety regulations in many countries require that industry complies with specific noise level standards for the protection of employees.
Rubber lined structures and fabrications play a prominent role in creating a more comfortable working environment. This is done by reducing noise and vibrations, often with the additional benefit of controlling dust dispersion.

SPECIFICATIONS

DENAIS ® SOSR Lined Steel Pipe
Typical Connection: Flange Connection

Nominal Dia. DN	Steel Pipe Spec.	Inner Lining Thickness (mm)	Unit Length (m)
100	Φ108x4	Up to 65	Up to 6
125	Φ133x4		
150	Φ159x5		
175	Φ194x6		
200	Φ219x6		
225	Φ245x6		
250	Φ273x6		
300	Φ325x7		
350	Φ377x7		
400	Φ426x7		
450	Φ480x7		
500	Φ530x8		
600	Φ630x8		
700	Φ720x10		
800	Φ820x10		
900	Φ920x10		
1000	Φ1020x10		
1200	Φ1220x10		

*We offer customer design service for non-standard products.

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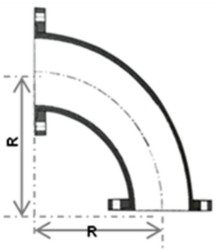
SPECIFICATIONS

DENAIS® SOSR Lined Elbow
Typical Connection: Flange Connection



Nominal Dia. DN	Steel Pipe Spec.	Inner Lining Thickness (mm)	Bending Radius (mm)
100	Φ108x4	Up to 50	150
125	Φ133x4		190
150	Φ159x5		230
175	Φ194x6		260
200	Φ219x6		300
225	Φ245x6		340
250	Φ273x6		375
300	Φ325x7		450
350	Φ377x7		525
400	Φ426x7		600
450	Φ480x7		675
500	Φ530x8		750
600	Φ630x8		900
700	Φ720x10		1050
800	Φ820x10		1200
900	Φ920x10		1350
1000	Φ1020x10		1500
1200	Φ1220x10		1800

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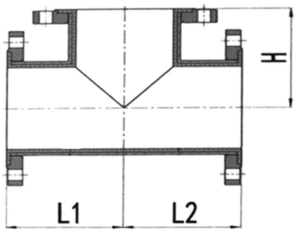
SPECIFICATIONS

DENAIS® SOSR Lined Tee Pipe
Typical Connection: Flange Connection



Nominal Dia. DN	Steel Pipe Spec.	Inner Lining Thickness (mm)	Main Pipe Length (mm)		Branch Height H (mm)
			L1	L2	
100	Φ108x4	UP to 65	150	150	150
125	Φ133x4		190	190	190
150	Φ159x5		205	205	205
175	Φ194x6		230	230	230
200	Φ219x6		230	230	230
225	Φ245x6		240	240	240
250	Φ273x6		280	280	280
300	Φ325x7		305	305	305
350	Φ377x7		350	350	350
400	Φ426x7		400	400	400
450	Φ480x7		450	450	400
500	Φ530x8		500	500	450
600	Φ630x8		600	600	500
700	Φ720x10		700	700	550
800	Φ820x10		800	800	650
900	Φ920x10		900	900	700
1000	Φ1020x10		1000	1000	800
1200	Φ1220x10		1100	1100	850

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DENAIS® SOSR TYPICAL PHYSICAL PROPERTIES

PROPERTY	UNIT	TEST STANDARD	DENAIS®SOSR
Polymer Type			Polychloroprene
Hardness (A)	Shore A	ISO48	54
Tensile Strength	Mpa	ISO37	19.8
Elongation at Break	%	ISO37	606
Tear Strength	N/mm	ISO34	31
Low Temperature Brittleness	℃	GB/T1682	-51℃
Rebound Resilience	%	ISO4662	58
Oil Resistance (Volume Swell)	%	ISO1817	19.8
Abrasion Resistance	%	ISO4649	26
Accelerated Ageing and Heat Resistance	100℃ for 72 Hours	ISO188	ΔHardness: 6 ΔTensile Strength: 10.6% ΔElongation at Break: -13.4%
Specific Gravity	g/cm^3	ISO2781	1.32
Operating Temperatures (continuous use)	℃		-40℃ to +100℃