

## DENSO S43™ / R23™ TAPE

Inner and Outer Wrap Components of Denso Butyl Tape System

### Description

Denso S43 Tape is a self amalgamating butyl rubber based compound, reinforced by a polyethylene film. It is the inner wrap component of the Denso Butyl Tape System and is used in conjunction with the Denso R23 Tape (outer wrap). The Denso R23 Tape is a self amalgamating butyl rubber with a polyethylene backing.

### Uses

The Denso Butyl Tape System is designed for the protection of buried or immersed line pipe, joints, welds, bends, fittings and for repairs to damaged areas in factory coated pipes. Denso S43 Tape provides the corrosion protection to the substrate. The Denso R23 Tape provides the mechanical protection to the system.

### Features

- Self amalgamating butyl rubber compound
- Non-hardening and non-cracking
- Excellent resistance to mineral acids, alkali and salts
- Compatible with factory applied pipeline coatings such as fusion bonded epoxies (FBE), polyethylene (PE) and polypropylene (PP), polyurethane (PU) and bitumen
- Suitable for application by Denso Hand Wrapping Machine

### Application

Prepare surface to ISO 8501-1 Sa 2½. Edges should be chamfered to remove step down. Abrade approximately 100 mm band of the pre-existing factory coatings and solvent (toluene) degrease either side of the joint.

Priming: Denso Butyl™ Primer should be applied to the prepared substrate at a rate of 4 m<sup>2</sup>/L and allowed to tack-dry (5 to 10 minutes) before applying mastic or tape.

Profiling: Denso Butyl Mastic™ Strip is used to contour weld beads, step down on shop coatings and fill irregular surfaces prior to tape wrapping. Denso Butyl Mastic Strip can be cut into smaller strips and moulded into crevices.

Inner Wrap: Denso S43 Tape should be applied with 55% overlap using the Denso Hand Wrapping Machine™. Grey adhesive side is applied to the substrate.

Outer Wrap: Denso R23 Tape should be applied with a minimum 25 mm or maximum 55% overlap (as specified) using Denso Hand Wrapping Machine. Black adhesive side is applied to the Denso S43 Tape (inner wrap).

Denso recommends that width of tape be no greater than 50% of pipe diameter to ensure ease of application.



# Denso S43™ Tape/R23™ Tape

## Property Specifications

PROPERTIES	S43 TAPE	R23 TAPE
Thickness (ASTM D1000)		
Adhesive - inside coating	≥ 0.45 mm	≥ 0.30 mm
Adhesive - outside coating	≥ 0.04 mm	-
Backing	≥ 0.31 mm (Black)	≥ 0.20 mm (White)
Total Thickness	≥ 0.80 mm	≥ 0.50 mm
Tape Strength		
DIN EN 12068	≥ 9 N/mm, ≥ 45 MPa	≥ 10 N/mm, ≥ 50 MPa
ASTM D 1000	≥ 9 N/mm, ≥ 45 MPa	≥ 10 N/mm, ≥ 50 MPa
Elongation @ Break (DIN EN 12068)	≥ 750%	≥ 750%
Elongation @ Break (ASTM D1000)	≥ 800%	≥ 750%
Hardness of the polyethylene foil (DIN 53505, ISO 868)	≥ 40 Shore D	≥ 40 Shore D
Peel Strength		
Tape to Tape @ 100 mm/min (DIN EN 12068, ASTM D1000)	4.0 N/mm (@23°C) 0.2 N/mm (@50°C)	0.5 N/mm (@23°C) 0.2 N/mm (@50°C)
Tape to Tape @ 300 mm/min (DIN EN 12068, ASTM D1000)	5.0 N/mm (@23°C) 0.5 N/mm (@50°C)	0.8 N/mm (@23°C) 0.2 N/mm (@50°C)
Water Absorption (DIN EN ISO 62, ASTM D570)	≤ 0.08 %	≤ 0.08 %
Chemical Resistance (24 h storage at 23°C)		Resistant to: 0.1 N NaOH 0.1 N Na <sub>2</sub> SO <sub>4</sub> 0.1 N H <sub>2</sub> SO <sub>4</sub> 0.1 N HCl
Ageing Resistance after 100 days at 70°C (ISO 21809-3/AS 4822-2018)		
Elongation at Break, E <sub>100</sub> /E <sub>0</sub>	0.98	0.99
Elongation at Break, E <sub>100</sub> /E <sub>70</sub>	1.00	0.90
Peel Strength Between Tape Layers, P <sub>100</sub> /P <sub>0</sub>	1.05	0.92
Peel Strength Between Tape Layers, P <sub>100</sub> /P <sub>70</sub>	0.99	1.04
Peel Strength Between Tape Layers, P <sub>100</sub> /P <sub>0</sub>		1.02
Peel Strength Between Tape Layers, P <sub>100</sub> /P <sub>70</sub>		1.02
Peel Strength to Pipe Surface, P <sub>100</sub> /P <sub>0</sub>		0.99
Peel Strength to Pipe Surface, P <sub>100</sub> /P <sub>70</sub>		1.07
Temperature Range		
For Application		-30°C to 50°C
For Service		-30°C to 50°C
Peak Intermittent Service Temperature		65°C
Roll Width	50 mm, 100 mm, 150 mm	
Roll Length	15 m (S43), 30 m (R23)	
Recommended Primer	Denso Butyl Primer	



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# Denso S43™ Tape/R23™ Tape System

## Property Specifications

PROPERTIES	VALUE	
Properties of Denso S43 Tape (Inner) / Denso R23 Tape (Outer) System		
Impact Resistance (AS4822:2018)	≥ 4.0 J/mm	
Impact Resistance (DIN EN 12068)	15 J	
Impact Resistance (ISO 21809-3)	5.7 J/mm	
Indentation Resistance		
Pressure (DIN EN 12068)	10 N/mm <sup>2</sup> (@23°C & 50°C)	
Residual Layer Thickness (AS 4822-2018)	≥1.9 mm (@50°C)	
Residual Layer Thickness (ISO 21809-3)	≥0.90 mm (@23°C), ≥0.60 mm (@50°C)	
Specific Electrical Insulation Resistance (DIN EN 12068, ISO 21809-3)	≥ 10 <sup>11</sup> mm	
Dielectric Breakdown (ASTM D149)	≥ 40 kV/mm	
Cathodic Disbondment, 28 days (AS 4822-2018)	≤ 5.5 mm (23°C)	
Cathodic Disbondment, 28 days (DIN EN 12068, ISO 21809-3)	≤ 8.0 mm (@ 23°C), ≤15 mm (@50°C)	
Ageing Resistance, Alteration of Peel Strength to Pipe Surface, 100 day, 70°C	≤ 10%	
Peel Strength	23°C	50°C
On Pipe Surface @ 300 mm/min (ASTM D1000)	≥ 4.0 N/mm	≥ 0.5 N/mm
On Pipe Surface @ 10 mm/min (DIN EN 12068, ISO 21809-3)	≥ 2.0 N/mm	≥ 0.2 N/mm
On Factory Coating @ 300 mm/min (ASTM D1000)	≥ 2.0 N/mm	≥ 0.5 N/mm
On Factory Coating @ 10 mm/min (DIN EN 12068, ISO 21809-3)	≥ 2.0 N/mm	≥ 0.2 N/mm
Outer Tape to Inner Tape @ 300 mm/min (ASTM D1000)	≥ 2.0 N/mm	≥ 0.5 N/mm
Outer Tape to Inner Tape @ 100 mm/min (DIN EN 12068, ISO 21809-3)	≥ 2.0 N/mm	≥ 0.2 N/mm
On Pipe Surface After Hot Water, 28 Days @ 50°C (ISO 21809-3)	≥ 2.1 N/mm	
On Factory Coating After Hot Water, 28 Days @ 50°C (ISO 21809-3)	≥ 2.1 N/mm	
On Pipe Surface @ 100 mm/min (AS 4822-2018)	4.6 N/mm (30°C), 2.4 N/mm (35°C), 1.9 N/mm (40°C), 1.1 N/mm (45°C), 1.0 N/mm (50°C), 0.9 N/mm (55°C), 0.7 N/mm (60°C)	
Lap Shear Strength		
On Steel @ 10 mm/min (AS 4822-2018)	≥ 0.25 N/mm <sup>2</sup>	-
On Steel @ 10 mm/min (DIN EN 12068, ISO 21809-3)	≥ 0.1 N/mm <sup>2</sup>	≥ 0.1 N/mm <sup>2</sup>
On Factory Coating @ 10 mm/min (DIN EN 12068, ISO 21809-3)	≥ 0.1 N/mm <sup>2</sup>	≥ 0.1 N/mm <sup>2</sup>
On Factory Coating @ 1.3 mm/min (ASTM D1002)	≥ 0.1 N/mm <sup>2</sup>	≥ 0.1 N/mm <sup>2</sup>

STORAGE: In cool, dry ambient conditions and away from heat and direct sunlight.



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