

World Class Lay-flat hoses

Agriculture

- Drag Hose system
- Slurry Transfer
- Supply Line
- Irrigation



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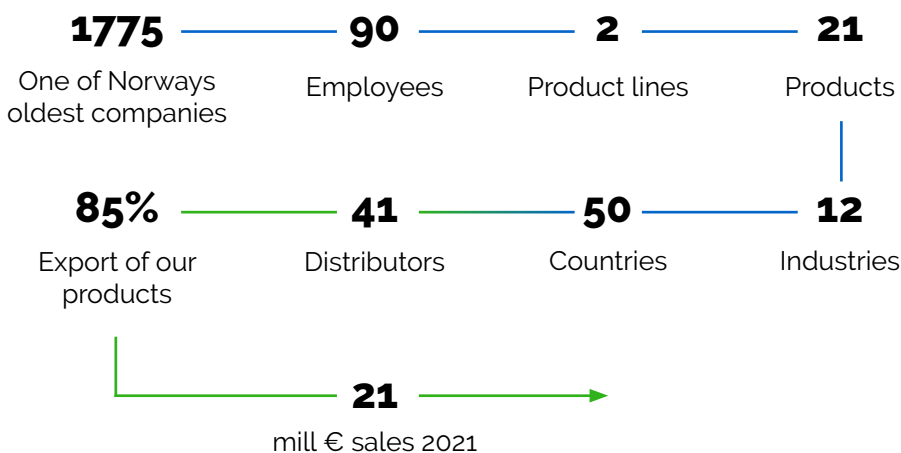
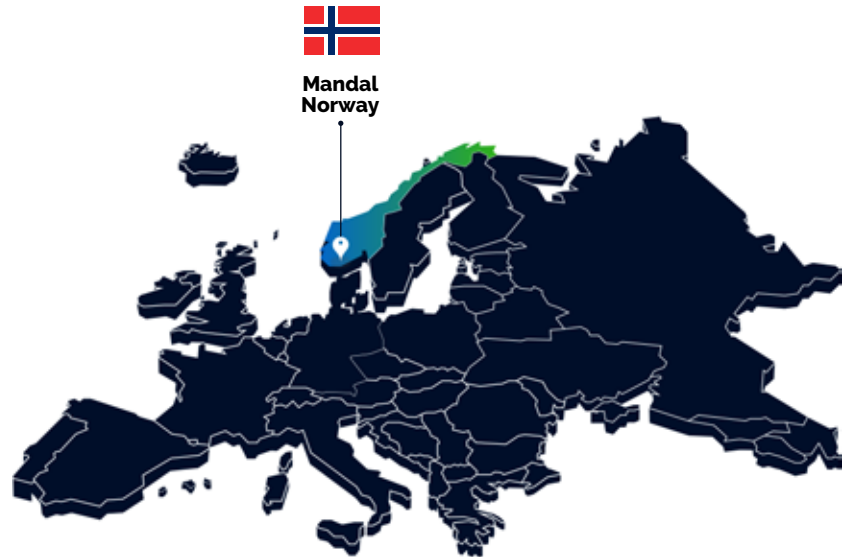


Abbreviations

AG	Agriculture
HVT	High Volume Transfer
NBR	Nitrile Rubber
TPU	Thermoplastic polyurethane

About us

Mandals specialize in the manufacturing of high quality lay-flat hoses and circular shuttle looms. We are based in Mandal, on the southern coast of Norway and have been in business in the same location for nearly 250 years. We have come a long way since our establishment in 1775, and today we are one of the worlds most recognized manufacturers of lay-flat hoses and looms. 85% of our production is exported and Mandals products are found across the globe thanks to our long-standing partners and distributors.



Why Mandals

mandals
since 1775
A Michelin Group Company

We strive to grow long-term, loyal partnerships. Our core values are People, Planet and Profit and we will always focus on people first. As a partner with Mandals that means that we will do our best to put you first, aiming to offer you the best service in all aspects of the partnership. We expect active partners that will challenge, inspire and help us grow and build business together.

We define ourselves as a trustworthy supplier with high focus on quality in the production process and products. All lay-flat hoses and looms are produced in-house, meaning that you can be assured that we produce quality without compromise.

Our AG hoses

Mandals lay-flat hoses have been the preferred solution in global agricultural sector for decades.

The durability and wear resistance provide long lasting hoses for such demanding use.

Quick deployment and retrieval, combined with excellent flow rates and long life time, reduce operating cost.

We offer hoses especially designed for use with umbilical drag hose systems. This ensures environmentally friendly and safe manure distribution, and also prevents hard-packing of the soil.

▶ Rubber hoses

▶ Thermoplastic polyether-based polyurethane (TPU) hoses.

Rubber hoses

Mandals rubber hoses are made from a blend of nitrile rubber and PVC, with an added UV barrier. The rubber is fully extruded through the circular woven polyester fabric, ensuring excellent bonding between cover and lining to prevent delamination. Thanks to the interlocking between the warp yarns and the weft of the circular weave, the hose has a high lengthwise stability and a full diameter recovery after use. The abrasion and puncture resistance of Mandals rubber hose is by far superior to any regular uncovered textile hose.

TPU hoses

Our TPU hoses are among the most innovative lay-flat hoses in the world, which are made from extruded thermoplastic polyurethane (TPU) with excellent wear and tear properties. The TPU is extruded through the weave, which is made of high tenacity filament polyester yarns. This method gives a very strong bonding between cover and lining as well as firmly encapsulating the woven polyester yarn. The abrasion resistance of the Mandals TPU hoses is among the highest available, and our TPU hoses also have excellent resistance against the most commonly used chemicals, UV radiation, hydrolysis and fungus degradation.



Our Lay-flay hoses

Dragman Series

TPU Drag Line



Superman HVT

TPU Supply Line



Ultraman & Ultraman HVT

A multipurpose TPU transfer hose



Flexitex Series

Rubber Supply Line



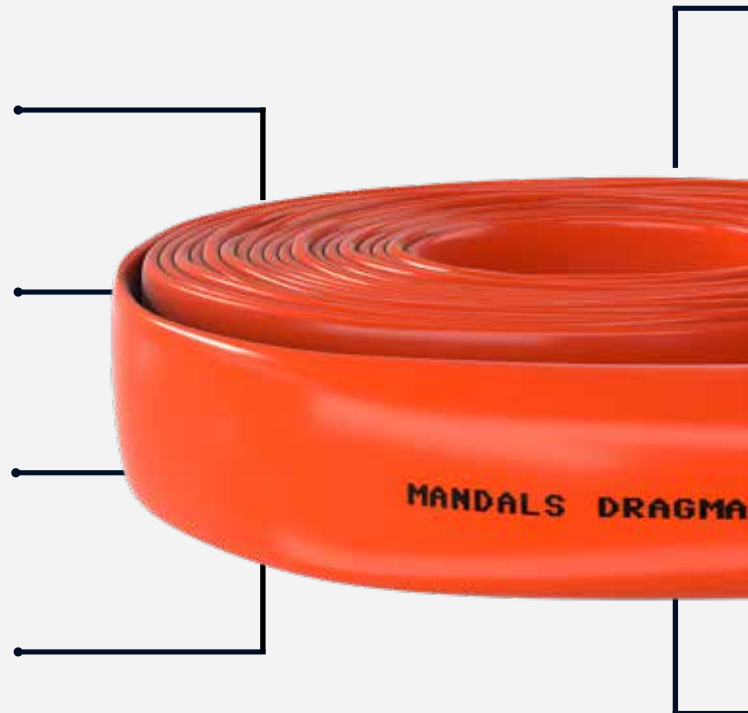
Advantages of Mandals AG hoses

Quick deployment and retrieval, combined with **excellent flow rates** and long lifetime, **reduces operation cost**

High abrasion resistance and tensile strength

Excellent mechanical adhesion between the layers provides the best quality hose with a long lifetime

Highly flexible hoses = Kink resistant and minimal pressure loss



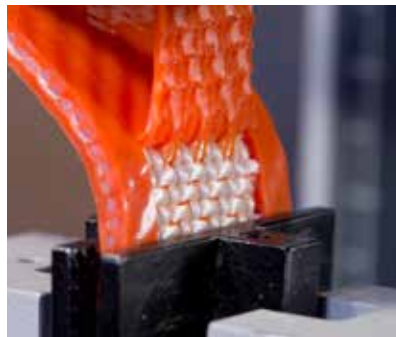
Continuous development & quality control

One of the values we live by is **innovation through legacy**, meaning that we will always work to further develop our products, our production processes and the way we do business with our partners. We are following the trends in the market and continuously working on developing new products and solutions for your unique challenges.

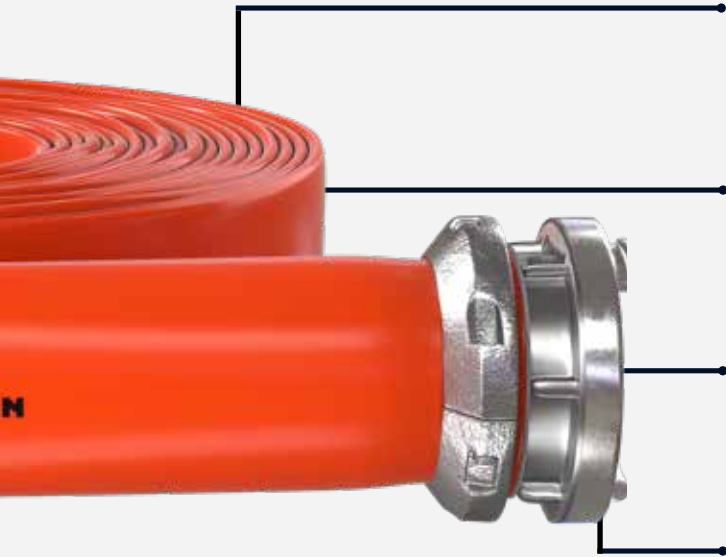
Raw materials, and finished products are tested and documented according and compliant to international standards

Examples:

ISO 4671 - methods of measurement
 ISO 1402 - hydrostatic testing
 ISO 8033 - adhesion
 BS 6391 - abrasion
 NS 4016 - heat resistance



Durability and **wear resistance** provide for long lasting hoses for demanding use



Resistant to most industrial chemicals, ozone and UV-rays

Durable even in the **roughest environments**

Small logistical footprint required for transport and storage

Unique weave design that is specially developed for each hose

Easy to handle - less heavy lifting

Looms & Spares

We pioneered the lay-flat hose a century ago and developed our first circular loom in 1935. Today you can find our machines in over 30 countries, some of which have been in service for over 50 years. Our machines continue to define the standard for quality and reliability in circular looms.



Scan the QR code if you would like to know more about our looms



mandats
since 1775

A Michelin Group Company



AG
Lay-flat hoses

Umbilical Drag Hose System

Dragman Standard has a medium thickness of TPU. This gives good abrasive resistance and long service life on a soil not too abrasive and rough. Very high tensile strength and low kink radius.

Dragman Extra has significantly more weave and TPU thickness compared to Dragman Standard. The hose also has a higher tensile strength and extra strong adhesion. Big diameter expansion means lower pressure loss. Intended for larger fields and large diameters. This gives a hose with added strength and resistance to wear and tear.

Dragman Premium is designed to handle smaller fields effectively, with a supreme kink resistance on sharper turns. It has similar TPU thickness and adhesion as Extra giving an optimal resistance to wear and tear even on rougher surfaces.

Mandals Superman is a hose intended for large volume transfer under high pressure and is widely used as supply hoses for large agricultural systems.

Mandals Ultraman is a multipurpose transfer hose, which is suitable as a feeder hose or even as a drag hose in smaller umbilical systems.

Mandals Flexitex Standard is a general purpose hose for use in agricultural systems.

Mandals Flexitex Extra is a more reinforced fluid transfer hose for agricultural systems, but may also serve as a drag hose in smaller umbilical systems.



08

01



Dragman (series)

02



Superman HVT

03



Ultraman

04



Flexitex (series)

Drag Line

Dragman Series

TPU hoses (Standard, Extra, Premium)

Our Dragman hoses are high quality flexible lay flat hoses designed for especially rough use with umbilical drag systems for distribution of slurry and manure in agricultural fields. Hoses are connected between slurry reservoirs (lagoons), where the drag hoses are used closest to the tow tractor. Between the lagoon and the edge of the field, the slurry/manure are transferred using supply line hoses.



TPU lining for greater performance



Easy to deploy and store



Flexible and light weight

Key Features

- Designed for umbilical drag system used for distribution of slurry and manure in agricultural fields.
- Engineered with extreme tensile strength and abrasion properties.
- Circular woven with High tenacity polyester yarns.
- Operating temperature from -50°C to $+65^{\circ}\text{C}$ (-58°F to $+149^{\circ}\text{F}$).

Advantages

- High tensile strength.
- Enhanced abrasion resistance.
- Diameter and extension stability.
- Low kink radius.
- High puncture resistance.
- Excellent UV and weathering resistance.
- Some diameters can be produced in lengths above 200 meters.

Thermoplastic polyether based polyurethane (TPU)



Engineered with extreme tensile stress and abrasion properties

Extruded through a circular woven jacket

Dragman Standard

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
3 1/2	90 + 2	0.14	3.4	0.70	1.05	650	45	28.7	13.0
4	102 + 2.5	0.14	3.6	0.91	1.35	610	42	32.9	14.9
4 1/2	114 + 2.5	0.14	3.6	1.01	1.50	520	36	37.5	17.9
5	127 + 2.5	0.14	3.6	1.11	1.65	460	32	43.9	19.9
5 1/2	140 + 3.0	0.15	3.8	1.29	1.92	435	30	48.3	21.8
6	152 + 3.0	0.15	3.8	1.41	2.10	405	28	56.4	25.5

Dragman Extra

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
4	102 + 2.5	0.16	4.0	1.07	1.60	535	37	37.5	17.9
4 1/2	114 + 2.5	0.17	4.2	1.16	1.73	450	31	43.9	19.9
5	127 + 2.5	0.17	4.2	1.31	1.95	435	30	48.3	21.8
5 1/2	140 + 3.0	0.17	4.2	1.44	2.15	435	30	56.4	25.5
6	152 + 3.0	0.17	4.4	1.54	2.30	435	30	60.4	27.3
7	178 + 3.0	0.17	4.4	1.84	2.75	580	40	81.2	36.8
7 1/4	183 + 3.0	0.17	4.4	1.84	2.75	580	40	81.2	36.8

Dragman Premium

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
4	102 + 2.5	0.17	4.2	1.14	1.70	535	37	34.0	15.4
4 1/2	114 + 2.5	0.17	4.2	1.14	1.70	535	37	34.0	15.4
5	127 + 2.5	0.17	4.3	1.31	1.95	465	32	37.8	17.1



Superman HVT

TPU hose

This premium lay-flat hose has been designed for long life and maintenance-free service in the harshest environments. The best choice for transfer of large volumes under high pressure, and is widely used as supply hoses for large agricultural systems.



Easy to deploy and store



High abrasion and kink resistance



Long lifetime and maintenance free



Minimum snaking of pressurized hose



Designed to operate in the harshest environments

Key Features

- Transfer large volumes of liquid at higher than normal working pressures.
- Lightweight and easy to deploy.
- Ultimate abrasion and puncture resistance.
- High diameter and extension stability.
- Minimum "snaking" of pressurized hose.
- Operating temperature from -50°C to $+75^{\circ}\text{C}$ (-58°F to $+167^{\circ}\text{F}$) for pure water.

Advantages

- Full diameter recovery after pressure release.
- Excellent hydrolysis and fungus resistance.
- Diameter and extension stability.
- Resistance to a wide range of chemicals.
- Excellent UV, Ozone and weathering resistance.

State of the art "through the weave" extrusion technology



Excellent adhesion between cover/lining and the weave

Full diameter recovery after pressure release

Superman HVT

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
5	127 + 2.5	0.14	3.5	1.07	1.60	650	45	34.8	15.8
6	152 + 3.0	0.15	3.7	1.34	2.00	650	45	44.0	21.0
7	178 + 3.0	0.16	4.0	1.61	2.40	650	45	70.0	31.8
8	203 + 3.0	0.17	4.2	2.15	3.20	610	42	81.5	37.0
10	254 + 5.0	0.17	4.3	2.73	4.10	520	36	101.2	46.0
12	305 + 5.0	0.18	4.5	3.38	5.05	435	30	120.0	54.5





Supply & Irrigation Line

Ultraman & Ultraman HVT

TPU hoses

Ultraman is a multi purpose transfer hose, which is suitable as a feeder hose or even as a drag hose in smaller umbilical systems. Also suitable for irrigation. Longer lengths available for some diameters.



Multipurpose hose



High abrasion and kink resistance



As light as a NRB rubber hose - best in class



Best grade TPU



High diameter and expansion stability

Key Features

- Special weave design – no kinking at low pressure pumping.
- Light PU Hose.
- Five times as abrasive than Nitrile Rubber.
- Temperature range -50 to 75 °C (pure water).
- Excellent adhesion between cover and weave.
- Resistant to a wide range of chemicals.

Advantages

- Resistance to a wide range of chemicals.
- Excellent UV, Ozone and weathering resistance.
- Excellent adhesion between cover/lining and the weave.
- Excellent UV, Ozone and weathering resistance.
- Some diameters can be produced in lengths above 200 meters.

State of the art "through the weave" extrusion technology



Excellent adhesion between cover/lining and the weave

Excellent adhesion between cover/lining and the weave

Ultraman

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
2 1/2	65.0 + 2.0	0.11	2.8	0.44	0.66	810	56	14.3	6.5
3	76.0 + 2.0	0.11	2.8	0.54	0.84	780	54	17.4	7.9
3 1/2	90.0 + 2.0	0.11	2.9	0.66	0.98	620	43	20.0	9.1
4	102.0 + 2.5	0.13	3.2	0.80	1.20	610	42	22.2	10.1
4 1/2	114.0 + 2.5	0.13	3.2	0.93	1.39	535	37	23.8	10.8
5	127.0 + 2.5	0.13	3.2	1.02	1.52	505	35	26.4	12.0
6	152.0 + 3.0	0.13	3.2	1.16	1.73	435	30	32.8	14.9
7	178.0 + 3.0	0.13	3.2	1.37	2.05	390	27	37.6	17.1



Ultraman HVT

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
8"	203 + 3.0	0.16	3.9	1.82	2.7	610	42	81.5	37.0
10"	254 + 5.0	0.16	4.0	2.35	3.5	520	36	101.0	46.0
12"	305 + 5.0	0.17	4.2	2.83	4.2	435	30	120.0	54.5

Supply & Irrigation Line

Flexitex Series

Rubber hoses (Standard & Extra)

Flexitex series is a heavy yet flexible reinforced fluid transfer hose for your irrigation system.

This Premium Lay-flat hose is made from a blend of nitrile rubber and PVC, with added UV barrier to prevent damage from UV radiation.



High degree of nitrile rubber.



Long lifetime with proper usage and storage



High burst pressure

Key Features

- Used as feeder hose for any type of water transfer application.
- General purpose, water discharge rubber hose.
- The hose is easy to store and deploy/retrieve.
- Adapts well to the terrain and can be routed around obstacles.
- Preferred supply hoses for irrigation and as feeder hoses for slurry systems.
- The hose is also used as a light weight wash down or transfer hose for water based and non polar liquids in construction and general industry.

Advantages

- Resistance to a wide range of chemicals.
- Temperature range -50°C to 75°C (pure water).
- Excellent UV, Ozone and weathering resistance.
- Excellent adhesion between cover/lining and the weave.
- Excellent UV, Ozone and weathering resistance.
- Some diameters can be produced in lengths above 200 meters.

The rubber blend is extruded through a circular woven reinforcement made from filament polyester yarn



Made from a blend of nitrile rubber and PVC, with added UV barrier to prevent damage from UV radiation

Very strong bonding between cover and lining as well as firmly encapsulating the reinforcing polyester

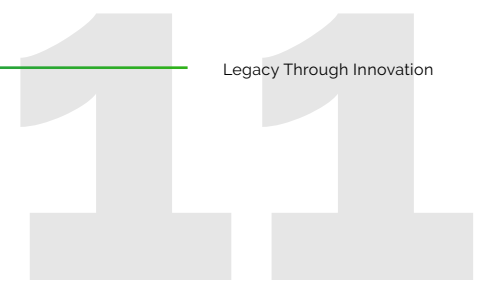
Flexitex

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
1 1/2	38.0 + 1.6	0.09	2.3	0.21	0.33	940	65	6.4	2.9
2	51.0 + 2.0	0.09	2.2	0.29	0.43	670	46	8.4	3.8
2 1/2	65.0 + 2.0	0.09	2.2	0.36	0.53	670	46	9.3	4.2
3	76.0 + 2.0	0.10	2.5	0.49	0.73	670	46	11.5	5.2
3 1/2	90.0 + 2.0	0.11	2.7	0.67	1.00	610	42	17.6	8.0
4	102.0 + 2.5	0.11	2.7	0.74	1.10	535	37	19.4	8.8
6	150.0 + 3.0	0.13	3.2	1.19	1.78	535	37	35.5	16.1



Flexitex Extra

Inner diameter		Wall Thickness		Weight		Burst Pressure		Tensile Strength	
Inch	mm	Inch	mm	Lbs / ft	Kg / m	Psi	Bar	X1000 lbs	Tons
3"	76 + 2.0	0.12	3.1	0.64	0.95	720	50	20.1	9.1
3 1/2	90 + 2.5	0.13	3.3	0.79	1.18	640	44	22.3	10.1
4	102 + 2.5	0.13	3.2	0.80	1.20	610	42	25.1	11.4
4 1/2	114 + 3.0	0.13	3.2	0.96	1.43	510	35	27.6	12.5
5	127 + 4.0	0.13	3.4	1.13	1.68	440	30	30.2	13.7
6	151 + 4.0	0.15	3.8	1.41	2.10	610	42	37.5	17.0



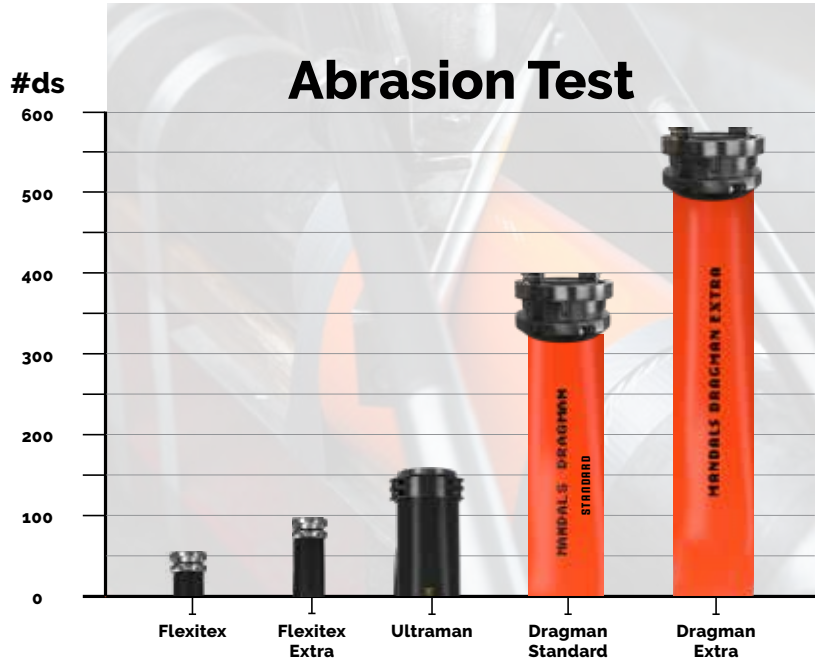
Abrasive Resistance

Abrasive resistance is a measurement that indicates how well a hose can handle wear and tear. The TPU or rubber quality, along with the thickness of the layer will be the main factors that determine a hose score on this metric.

Abrasion tests are performed with a piece of sand-paper mounted on a mechanical arm. The mechanical arm is dragged back and forth over the hose until the weave is exposed. A counter register the amount of double strokes (#ds) each hose can handle.

Mandals perform the measurement at the thinnest area of the hose and have also added an extra load to the test arm compared to the BS-6391 standard.

Mandals do regular benchmark testing to compare Mandals products to the rest of the market, and Mandals hoses consistently delivery high scores on this metric. This due to the high quality materials we use in our products.



Tensile Strength

Flexitex Standard

Inch	X1000 lbs	Tons
4"	19.4	8.8



Dragman Standard

Inch	X1000 lbs	Tons
4"	32.9	14.9



Flexitex Extra

Inch	X1000 lbs	Tons
4"	25.1	11.4



Dragman Premium

Inch	X1000 lbs	Tons
4"	34.0	15.4



Ultraman

Inch	X1000 lbs	Tons
4"	22.2	10.1



Dragman Extra

Inch	X1000 lbs	Tons
4"	37.5	17.9



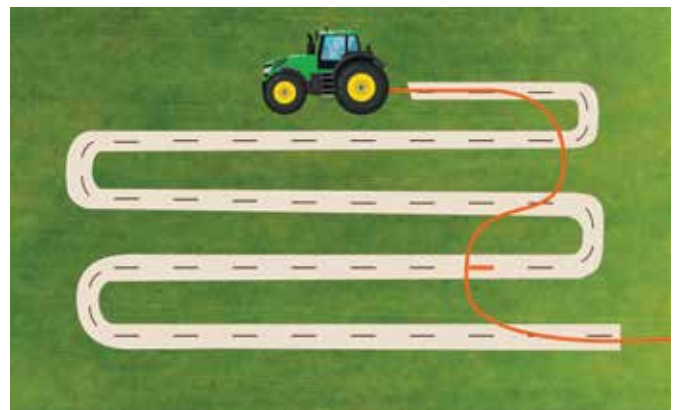
Drag Hoses vs Slurry Tank

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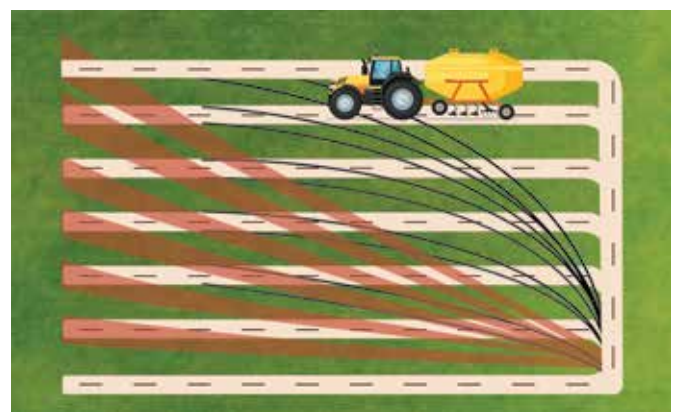
Drag hose system

- No soil compression.
- Lighter equipment.
- Immediate volume - no down time.
- Continuous flow - no refill.
- Flexible supply line from lagoon / pit.
- No occupancy of surroundings (public roads).
- Flexible hose dimensions available.
- Easy deployment and retrieval.
- Manure spreading also possible when the soil is soft or wet.



Using a drag hose system, the mission can be accomplished with one single pass with less than 10 tons of weight.

Slurry Tank system



A visualization of the way a tractor with a slurry tank travels on a field. A tractor with a tank can reach a total weight of 40 tons, compressing the soil leading to lower yields. Fuel consumption and roadway driving are also important factors.

World Class Lay-flat hoses

Agriculture

Let us contact you!

Scan the QR code below, fill in your information and the products you are interested in. One of our sales managers will get in touch with you shortly to help you with your challenges and suggest appropriate solutions for your needs.



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