Thiolon® LSR® 7300T Fiber Report

Thiolon LSR® - the fiber for hockey

This fiber is suitable for all hockey systems including sand filled and full synthetic pitches. This fiber is made of a special type of polyethylene, that is very resistant to splitting and wear – an important condition for full synthetic or waterbased hockey fields.

Apart from this, the LSR® fiber is capable of maintaining water better than polypropylene fibers resulting in an optimal playing surface and more efficient water use. Another advantage of LSR® compared to polypropylene fibers is the lack of differences in playing performance between a wet (after irrigation) and a dry field towards the end of the game.

Thiolon® Dynacurl Technology

The waterbased hockey field surface has a very dense structure with no sand, thus, the playing characteristics depends 100% on the characteristics of the art turf fibers. A smooth and high speed surface is created by means of curling of the fibers. We call this process “Dynacurl”.

During production, the Dynacurl is imprinted in the memory of the fiber. Dynacurl keeps it memory throughout the entire lifetime of the field. The result is a longlasting even and level surface.

Even more unique are the non-directional characteristics of the Dynacurl fibers. These offer consistent and predictable ball behavior unaffected by horizontal, vertical or diagonal passing off the ball. Dynacurl fibers keep their resilience, and also offer excellent capabilities to maintain water. Because off this, players can better lift the hockey ball with their stick, the so-called “3D-play”.

Thiolon® LSR® 7300T
Specification

THIOLON YARN SPECIFICATIONS

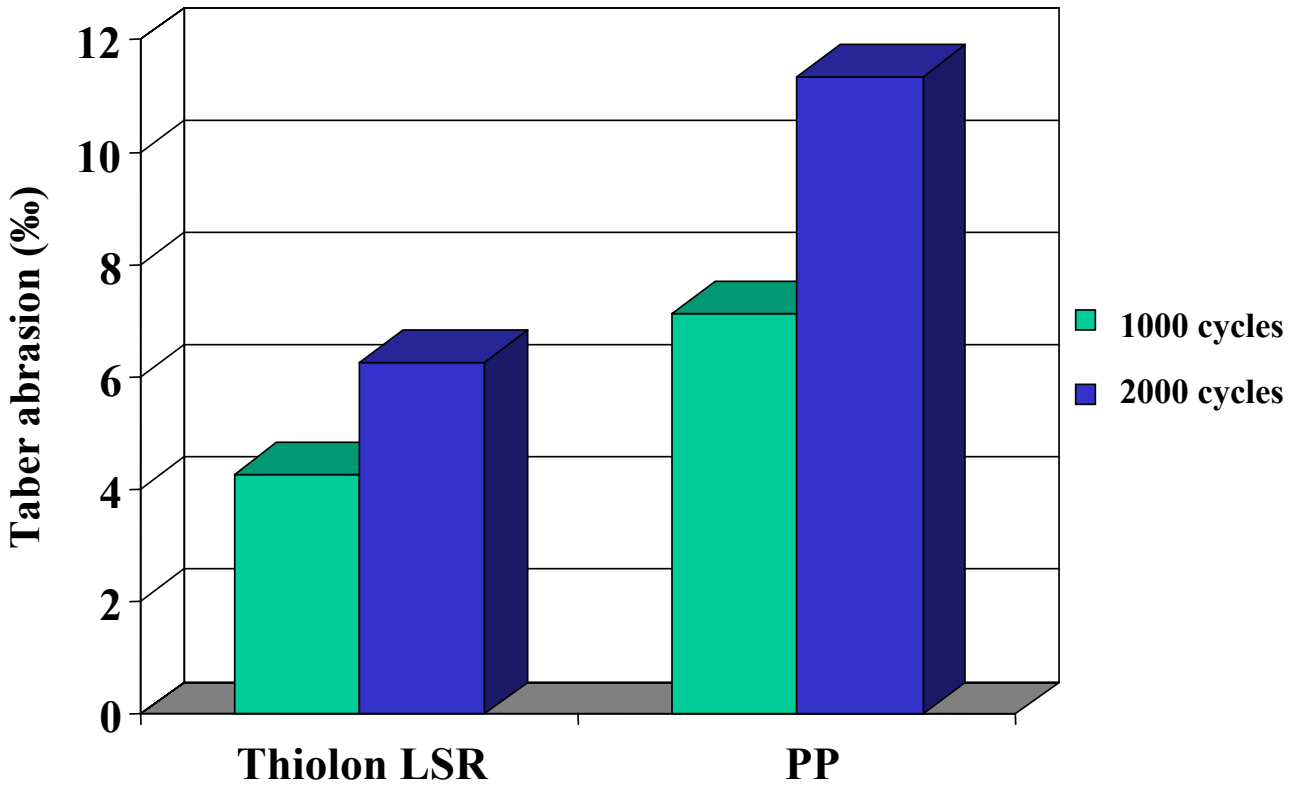
		UNIT	Typical value	Minimum	Maximum
Yarn count	*	dTex	7300	7000	7600
Tape thickness		micron	63	60	66
Tape width		mm	12.7	11.6	13.8
Cross section			rectangular		
Turns	*	T/m	40	36	44
Number of cuts / 10 mm.			6		
Tensile strenght (peak value)	*	N	100	90	
Elongation at break	*	%	50	35	65
Shrinkage at 90 °C	*	%	1.5	1	2
Style of texturising		KdK	3/5 inch		
Stitch length		mm	8	7	9
Coating temperature (maximum)		°C	90	85	90
Light fastness		blue scale	7/8	7	8

* The appointed values are based on the mean values of samples of 12 different bobbins

Testprocedures: Ten Cate Thiolon® standards

Abrasion

Fibres used in the sports surface industry must resist player and climate influences. One of the test methods available is the Taber test. In this test, two small, roughened wheels carry out a combined rolling/sliding movement across an artificial grass sample, indicating the wear resistance of the surface. This test can be done with both new and aged material, but is only useful for testing samples of water based pitches.

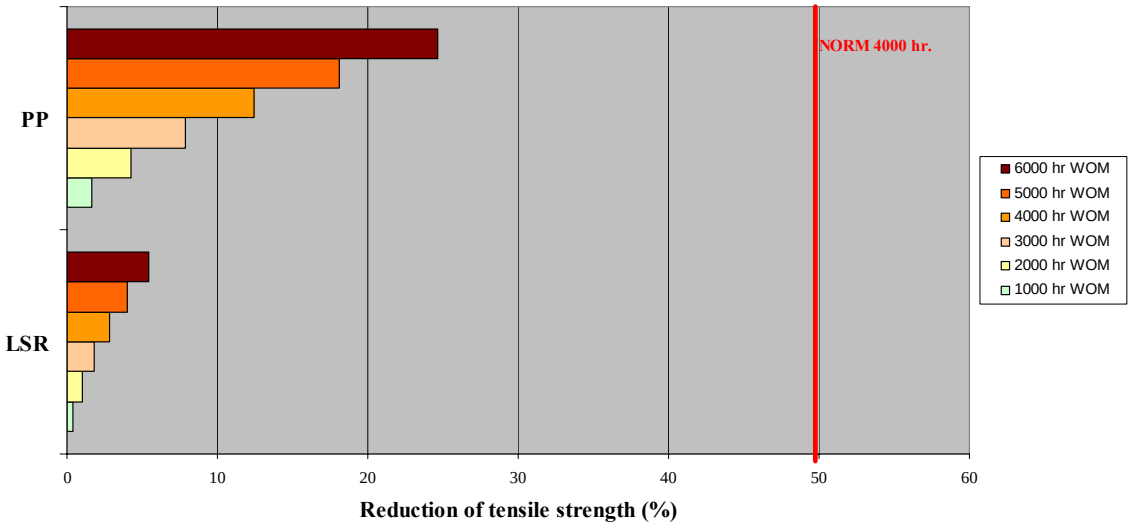


UV resistance

A very important requirement of fibres used in the production of artificial turf, is high UV resistance. Synthetic turf is usually laid outdoors, where it may suffer intense exposure to sunlight. This is particularly relevant in countries at low latitude. If the UV resistance is inadequate, the synthetic turf will age rapidly. The basic polymer and UV stabiliser used are key factors here.

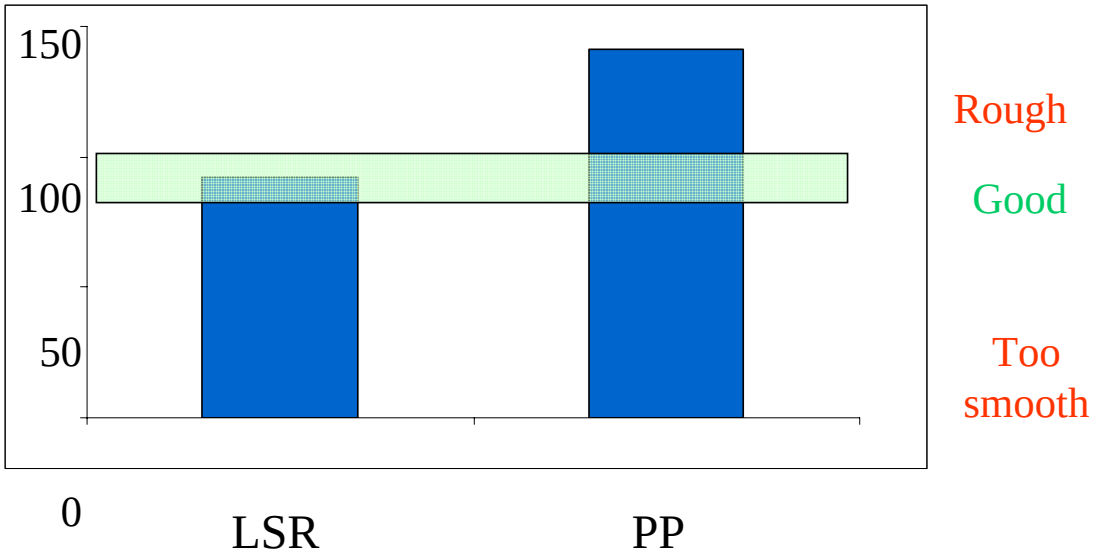
UV resistance is tested in the Weather-o-Meter (WOM), where the fibres are exposed to rain and a light source many times stronger than sunlight. The strength of the fibres is measured every 1,000 hours; the reduction in tensile strength representing a measure of the fibres' UV resistance. The tensile strength of the fibres may decrease by up to 50% after 4,000 hours in the WOM.

The difference in this respect between PP fibres and Thiolon® LSR® fibres is marked. This is clearly shown in the graph below. PP's tensile strength decreases by 12,5% after 4,000 hours, while LSR® loses only 2,8% of its tensile strength after the same period. As a result, LSR® is considered far more suitable for use in low latitudes, and the warranty period for LSR® fibres is generally longer than for PP fibres.



Underfoot friction

The underfoot friction is important for the players in order to reduce the risk of foot blocking during the foot-surface interaction. The method is different from the traction test, but it is measuring the same subject. Underfoot friction is obviously a measurement of the slipperiness of the surface and is measured using the Leroux machine as modified by NOC*NSF (Dutch Sports Federation).



In the graph the Leroux tests done by Labosport France are shown. The Leroux value gives an indication of the field, whether it is good, too rough or too smooth. It is clearly shown that LSR® is positioned in the safe area.

Environment

Thiolon® LSR fibers (produced in The Netherlands) are made out of raw materials that do not contain any color pigments based on heavy metals. Thiolon® fibers may be used anywhere and without any restrictions in sensitive areas.

Thiolon® fibers are easy to recycle based on the character of polyolefins.

In order to determine the concentrations of heavy metals in the Thiolon® fiber styles (produced in The Netherlands), Dr. Grunder from the Institute for Ecological Building Products has performed tests to measure the heavy metal concentrations. The requirements are based on the LAGA norm, which is a very strict German norm. The results are listed below:

Heavy metal	Unit	Thiolon LSR®	NORM
Lead	mg/kg	< 3	**85**
Cadmium	mg/kg	< 0.3	**0.8**
Chromium total	mg/kg	1.9	**100**
Copper	mg/kg	18	**-**
Mercury	mg/kg	< 0.2	**0.3**
Zinc	mg/kg	5.3	**140**
Tin	mg/kg	< 5	**-**

‘<’ Means that the measured value is below the detection limit of the measuring device.
These measurements confirm that TenCate Grass uses pigments and materials without heavy metals.

Environment

Besides the absolute concentration of heavy metals it is also important to know to which extent the present heavy metals are leachable. Dr. Grunder also measured this. The results can be found on the next page. The requirements are based on the DIN 18035-7 norm.

Heavy metal	Unit	Thiolon LSR®	NORM DIN 18035-7
Lead	mg/l	0.012	≤ **0.04**
Cadmium	mg/l	0.0011	≤ **0.005**
Chromium total	mg/l	< 0.005	≤ **0.05**
Copper	mg/l	0.05	**-**
Mercury	mg/l	< 0.0002	≤ **0.001**
Zinc	mg/l	0.27	≤ **3.0**
Tin	mg/l	< 0.005	≤ **0.05**

'<' Means that the measured value is below the detection limit of the measuring device.
These measurements confirm that Thiolon® fibers (produced in The Netherlands) may be used anywhere and without any restrictions in sensitive areas.

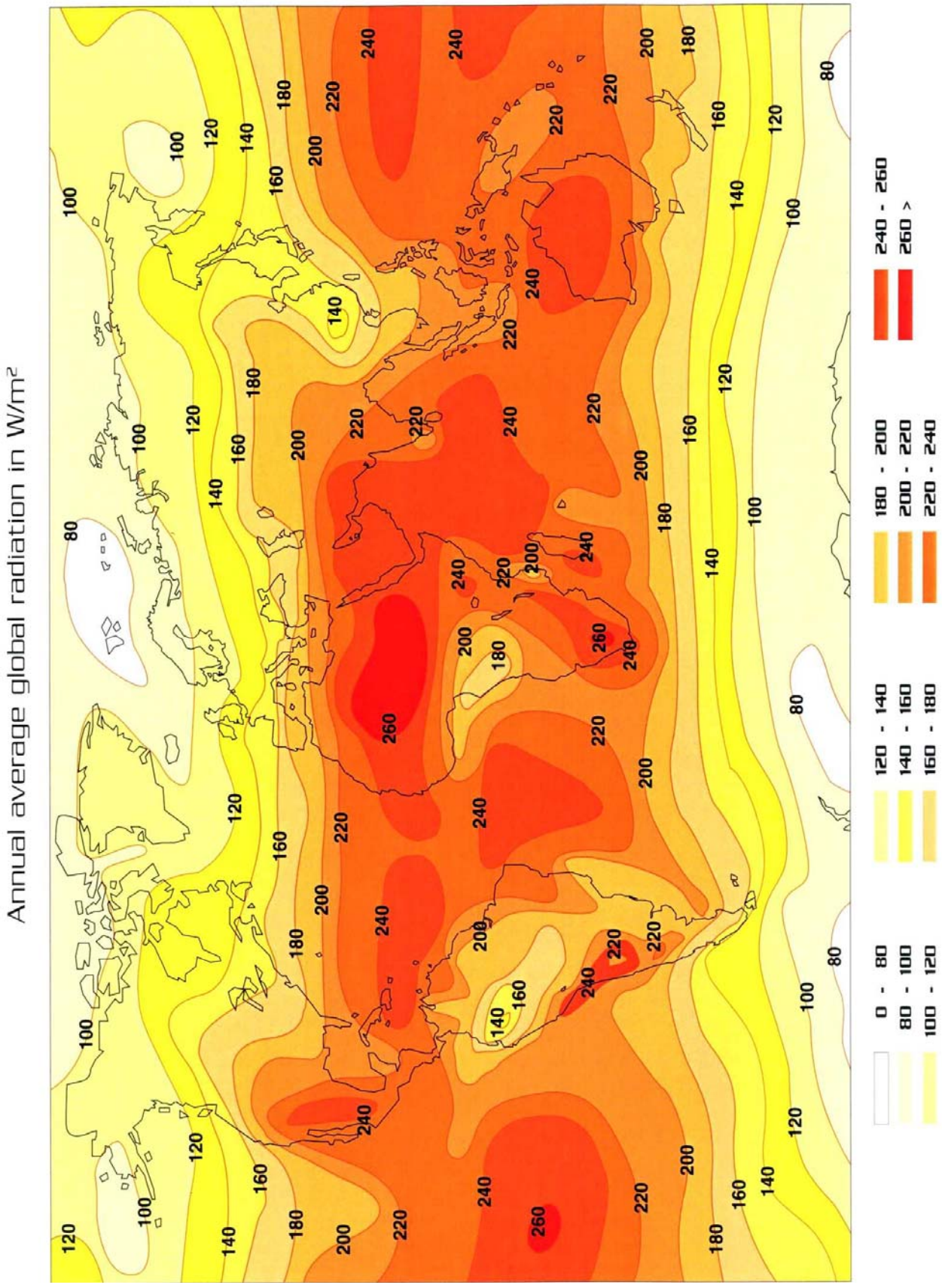
TenCate Grass Limited Warranty

Table below describes the warranty on UV stability and tensile strength. For purposes of this warranty, a product will be deemed to have maintained its UV stability and tensile strength if the original tensile strength of the product does not decrease by more than fifty percent.

Solar activity in W/m2	LSR® 7300 T
100 - 160	9 years
161 - 200	8 years
201 - 240	7 years
241 and more	6 years

Solar activity of the turf installation site in W/m2 is determined according to the climatic map of the world published by the KNMI, a copy of which is included in the next page. Please be aware that TenCate Grass does not warrant wear and tear caused by any use of pitches incorporating Thiolon® fibers.

Annual average global radiation in W/m2



Reference Projects

Olympic Games and other prestigious international hockey events are played upon Thiolon ® grass for years in a row already. The four artificial turf hockey fields constructed for the Olympic Games held in the summer of 2004 in Athens were used for no less then 71 games played in 12 days.

Thiolon Grass is presented at:

- FIH World Events
- World Cup Tournaments
- Champions Trophies
- Olympic Games 2000 and 2004