



Atlas Weather-Ometer®

# Artificial Grass Yarns – Improving Sports Performance

**Background** Artificial Grass, also known as artificial or synthetic turf, is a grass-like, man-made surface manufactured from synthetic materials. It is most often used in sports arenas where sport games were originally or normally played on grass. However, it is now being used for residential lawns and commercial applications, as well.

Artificial Grass first came to prominence in 1965, when Astro Turf® was installed in the newly-built Astrodome in Houston, Texas. After the installation of artificial surfaces in the 1980s in some football (soccer) clubs in Europe, artificial turf gained a bad reputation on both sides of the Atlantic with fans and especially with players. It became known as an unforgiving playing surface causing more injuries to players. Therefore, because the surfaces were much harder than grass, and aesthetically unappealing to many fans, the artificial surfaces were removed from many arenas and stadiums. In general, artificial grass was accepted for certain sports such as tennis and field hockey.

In 1997, new generation fields were installed in the US by Fieldturf who invented the system and used Bonar yarns to meet their system requirements. In the early 21<sup>st</sup> century, new artificial playing surfaces using sand and/or rubber infill were developed. This new generation of artificial turf is becoming more and more popular and the market has grown at double-digit rates.



**Requirements** Artificial weathering is essential to estimate the service lifetime required for artificial grass surfaces. The current standard for UV stability requirements is set so that yarns may not exceed 50% reduction in tensile strength after 6000 hours testing in a xenon-arc weathering instrument. Tests were performed in an Atlas Ci4000 Weather-Ometer® for a minimum of 6000 hours according to ISO 4892-2, subjecting the samples to a continuous light cycle of 0.50 W/m<sup>2</sup> at 340 nm and a Black Standard Temperature of 65° C including a spray cycle (102:18). The selected filter combination was “Type S Boro” for the inner and outer filter. This so called “Daylight Filter System” is the most common combination for weathering tests providing a perfect match to global solar radiation.



Virtually indistinguishable from grass when viewed from any distance, it is generally regarded as safe to play on as a typical grass surface:

- Artificial grass surfaces should last longer than natural turf and their durability makes them more suitable for multi use stadia.
- Artificial grass can be a better solution when the environment is particularly hostile to natural grass, such as an arid environment or one where there is little natural light.

Basically, three base materials are used to design artificial grass yarns:

- Polyamide (PA)
- Polypropylene (PP)
- Polyethylene (PE)

Polypropylene has shown the best performance for these important physical properties:

- Resilience
- Abrasion
- Post fibrillation

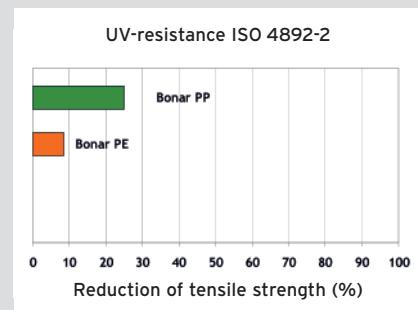


**Laboratory Accelerated Weathering** Ensuring that the grass stays green is key to customer's satisfaction, so substantial emphasis was placed on testing the products' resistance to the effects of UV rays, using the Ci4000 Weather-Ometer®.



Ci4000 Weather-Ometer®

The Ci4000 represents a significant advancement in applying digital and optical technologies in a laboratory weathering instrument.



**Conclusion** The market share for artificial turf in stadiums is increasing in many markets. Games on artificial turf are becoming widely accepted by FIFA and UEFA. Worldwide there are approximately 300 000 soccer clubs with more than 1 million soccer fields.

The main yarn producers are performing Weather-Ometer tests for their yarns. Unmatched repeatability and reproducibility, a reliable replication of full spectrum sunlight and the user-friendly operation are the main features for this accelerated weathering instrument, being capable of meeting global test specifications. However, other test methods (e.g. in a SUNTEST XXL+ or fluorescent tests in a UV2000) for synthetic turf may be used.

The graph shows the excellent UV performance of the polypropylene yarns. The yarns were tested up to 20 000 hours; yet, still show a reduction in tensile strength of less than 30% making them extremely suitable for long life outdoor applications. The radiant energy, accumulated during 20 000 hours of testing corresponds to a period of 20 years of solar radiation energy in average European climatic conditions.



Seahawks Stadium, Seattle

This case study is based on the following publication: "Bonar Yarns & Fabrics" by Bonar Yarns & Fabrics Ltd, St Salvador Street, Dundee DD3 7EU, UK.