



Daylighting in Stadium Roof Design with Palram Polycarbonate

The last two decades have seen a tremendous rise in the construction of covered stadia. In stadia around the globe, from small urban venues to national sport centers, it is becoming less acceptable to leave the fans exposed to the elements. And as stadium roofs became more common, so did solutions to provide natural light to the inside of the stadium bowl.

There are several options for translucent roofing materials that allow daylighting in stadia and other large structures. Of those materials, polycarbonate is the most popular in stadium construction due to its aesthetic options, durability, flexibility, high transparency and easy installation. Palram polycarbonate was used to cover over forty stadia, including venues in the last three FIFA World Cup tournaments.



Arena Castelão, Fortaleza, Brazil, venue for the 2014 FIFA World Cup

Why is daylighting so important in stadium design?

Healthy Grass

Wherever natural grass is used for the pitch, light is a mandatory requirement for its growth and health. In order to grow, grass requires Photosynthetic Active Radiation (PAR). PAR is the spectral range of solar radiation between 400 and 700 nanometers used by plants for the photosynthesis process. It roughly corresponds with the range of light visible to the human eye.

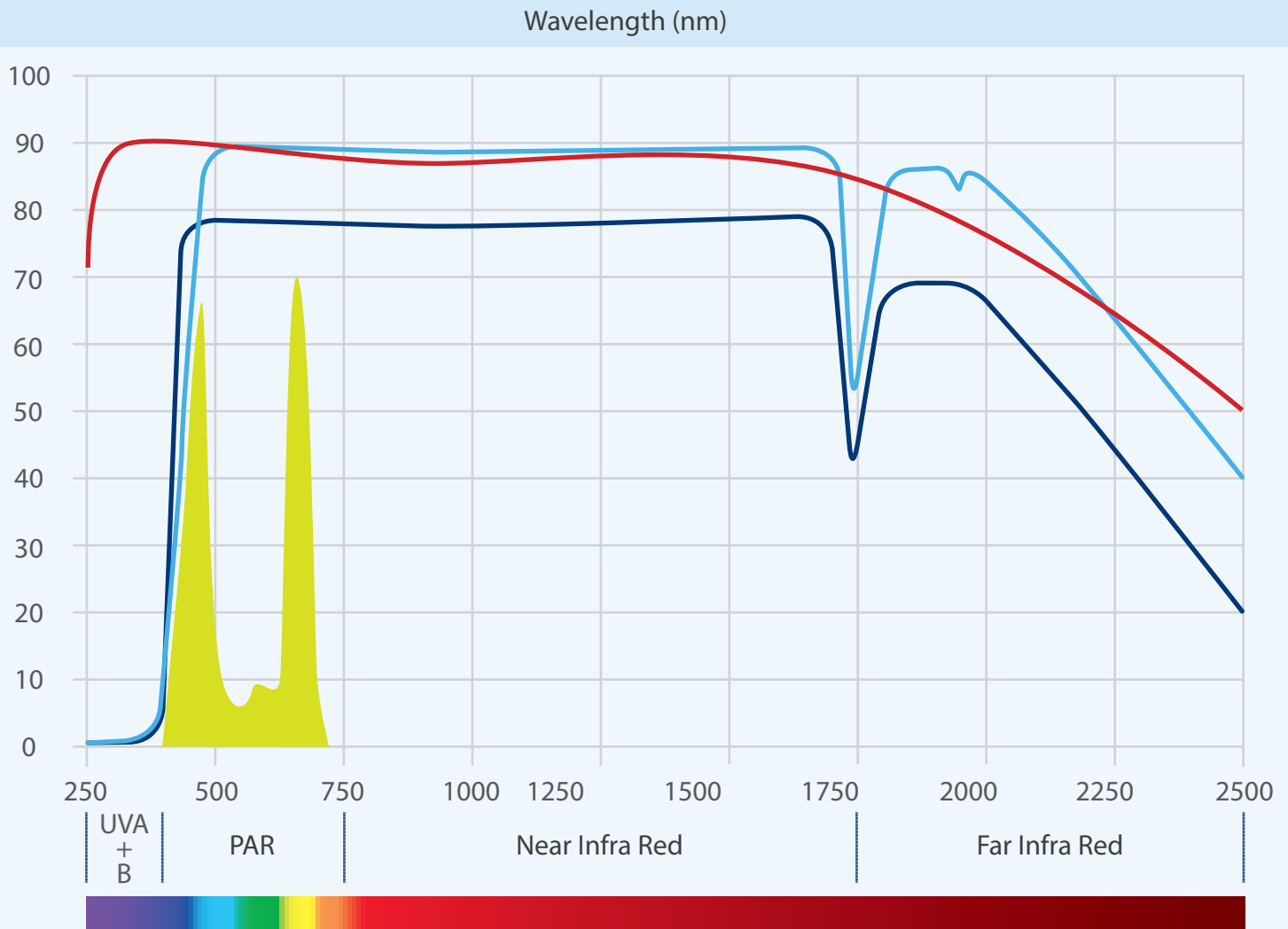
Polycarbonate allows penetration of the entire PAR range and is therefore commonly specified as the cover material of the inner ring of the roof, above the pitch.

■ **SUNLITE®**
 Multiwall Polycarbonate

■ **SUNTUF®**
 Corrugated Polycarbonate

■ **4 mm Glass**

■ Peak spectral sensitivities of chlorophyll a and chlorophyll b.



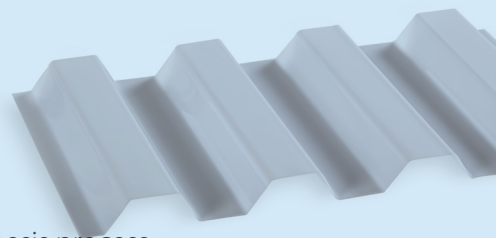
Legend:

UVA+B - Ultra Violet radiation

PAR - Photosynthetic active radiation - Grass Photosynthesis

PAR+NIR - photo morphogenesis

Chlorophyll a and chlorophyll b are most common pigments in plants photosynthesis process.



Solar radiation spectrum under different cover materials

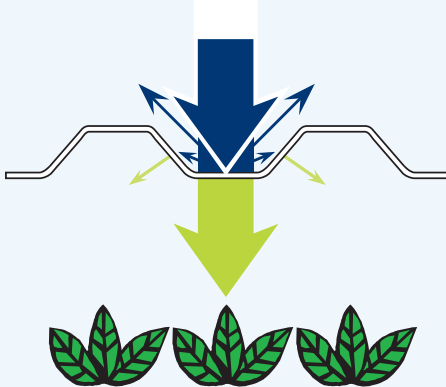
Polycarbonate can be produced with special additives, that control light transmission as well as light diffusion. For stadium roofs, Palram recommends an embossed finish which provides the optimal combination of high light transmission and even light dispersion.

Clear

Optimum for low light regions or where high clarity is essential



90% light transmission
0% Diffusion



Embossed

Offers high light transmission and good diffusion for excellent flexibility



90% light transmission
20% Diffusion



Diffuser

Combines uniform light spread with high light transmission



85% light transmission
100% Diffusion



Light transmission and light diffusion options with polycarbonate



Healthy Spectator Environment

Extensive research has shown the positive impact of natural daylight on people in environments such as medical, educational and retail. Wherever natural light is available, people tend to be healthier, more productive, and most important – happier. Daylighting is a strong trend in today's architecture, and stadium design is no different. Stadium roofs are usually designed to be translucent throughout, or to include translucent openings in certain parts of the roof.



Polycarbonate roof at Aviva Stadium, Dublin, Ireland

Save Energy

When there is so much natural light, why use artificial lighting? By implementing a translucent roof, stadium operators don't really need artificial lighting when the games are played during daylight hours. Saving money on energy is good for the stadium owners and good for the environment.



ANZ Stadium, Sydney, Australia, venue for the 2000 Olympic Games

Good for the grass, good for the fans, good for the environment – polycarbonate stadium roofs by Palram