

# Fear No Flats with Arnitel<sup>®</sup>



DSM is working with leading tire manufacturers in the outdoor power equipment and off-highway vehicle industry to increase performance and reduce downtime through the use of non-pneumatic (airless) tires. To help make these next-generation tires possible, manufacturers have turned to DSM for advanced material science expertise and application development support.

#### Non-pneumatic tire benefits

- Airless design — eliminating down time and labor for flat tire service calls
- Extended service life — 2-3x longer than traditional tires
- Dynamic absorption of energy during impact
- Tunable contact patch design minimizes turf damage
- Hard tread surface with soft response of the overall tire — resulting in improved wear performance without jeopardizing ride quality

#### The growing need for airless tires in off-road applications

Non-pneumatic tires are increasingly popular in the outdoor power equipment segment with particular growth in the all-terrain vehicle (ATV), utility vehicle (UTV), and golf cart markets. They all have common pneumatic tire issues, including rebound and damping on rough terrain, durability flaws, routine tire pressure monitoring, and downtime during a flat.

The popularity of non-pneumatic tires in ATV/UTV markets began as a solution for niche applications such as military forces operating in remote locations. Today, they're becoming increasingly popular for vehicles used in off-highway contract work, construction, farming, mining, emergency service

response, recreation, and other debris-laden areas where flat tires cause serious interruptions and potential personal safety risks.

Even in recreational vehicle industries such as the golf cart market, leading manufacturers are beginning to utilize the superior handling and reduced maintenance needs to improve the customer experience on and off the course.

### Landscapers leading the way

In the commercial lawn equipment market, leaders such as Toro and John Deere are increasingly leveraging the benefits of non-pneumatic tires in zero-turn mowers for professional landscaping. Repairing a flat tire is relatively inexpensive, but when landscapers account for machine downtime, the real cost can range from \$150 to \$350 of lost revenue during repair. And, because there is no need to maintain consistent air pressure to avoid balance issues with non-pneumatic tires, mower decks stay level for a more even cut, increasing customer satisfaction.

### Choosing the right materials for non-pneumatic tires

Since 2005, DSM engineers have partnered with leading tire manufacturers and OEMs to identify an optimal material solution for non-pneumatic tires. After years of rigorous testing versus thermoplastic polyurethane (TPU) and other materials, DSM's Arnitel® thermoplastic elastomer (TPE) emerged as the material of choice.

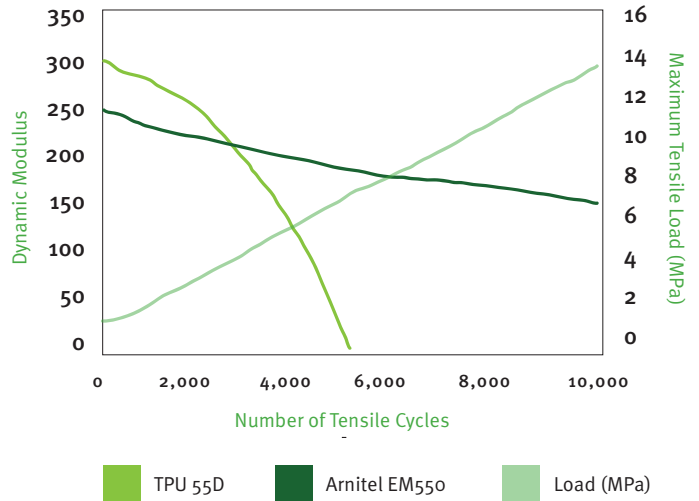
Arnitel® is properly suited for non-pneumatic tire applications because of its outstanding mechanical performance – flex fatigue endurance, high load bearing capability, excellent dynamic creep resistance, superior tear and abrasion resistance, and high-impact strength. Industry leaders also appreciate the enhanced sustainability of a tire manufactured using recyclable plastics instead of rubber.

These mechanical properties are combined with the thermal properties of Arnitel®, making it consistently perform under all foreseeable climate conditions: a wide operating temperature (-30 to +100°C), extremely low temperature ductility (<-40°C), and stable modulus as a function of temperature. Additional benefits are strong resistance to weathering, chemicals, hydrolysis, and microbial growth.

To learn more, visit [DSM.com/Arnitel](https://www.dsm.com/Arnitel)

## Dynamic Tensile Creep Comparison

(tensile hysteresis [ @1Hz] load increasing per cycle @23°C)



M. El Fray, V. Altstadt Polymer 44 (2003) 4635-4642

*DSM's Arnitel TPE is a superior solution for high-load and durability requirements compared to thermoplastic polyurethane (TPU) materials.*

## Arnitel® Recommended Grades

Grade	Melt volume flow rate cm <sup>3</sup> /10 min	Tensile modulus MPa	Density kg/m <sup>3</sup>	Shore D Hardness 3s
Arnitel PL420-H	23	100	1180	38
Arnitel EM460-88	46	85	1150	43
Arnitel PL461	39	135	1200	45
Arnitel X07715	23	150	1190	47
Arnitel EL550-08	23	170	1200	54



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The company is listed on Euronext Amsterdam. More information can be found at [www.dsm.com](https://www.dsm.com). © DSM 2020