

ASTM F 1112

*Standard Test Method for
Static Testing of Tubeless Pneumatic Tires for Rate of Loss of Inflation Pressure*

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ASTM F 1112: Scope

This test method covers the determination of the rate of inflation pressure loss resulting from air diffusion through the structures of tubeless tires under constant temperature conditions.

The testing is done under static conditions, that is, nonrotating, unloaded tires. [1.1]

ASTM F 1112: Significance and Use

- Inflation pressure retention is an important property of tire performance because underinflation can adversely affect tire rolling resistance, handling, structural integrity, and tread life. [5.1]
- This test method is useful for research and development evaluation of the effects of tire component formulations and geometry on inflation pressure retention. Testing for rate of pressure loss under static conditions is practical because of the following: [5.2]
 - Tires in normal use are predominantly at rest, and [5.2.1]
 - Relative air diffusion rates of various tires in normal intermittent road service will correlate with static relative rates, to a first approximation... [5.2.2]
- Test results from this method are not suitable for inferring tire inflation pressure retention under severe service conditions... [5.3]

ASTM F 1112: Pertinent Definitions

- *inflation pressure loss rate*, n-rate of change of normalized inflation pressure, determined from the slope of the linear portion of the log pressure versus time curve. [3.1.1]
- *measured inflation pressure*, n-gauge pressure of a tire measured at a given time under ambient temperature and barometric pressure. [3.1.2]
- *normalized inflation pressure*, n-measured pressure of a tire adjusted, according to the ideal gas law, to the nominal test temperature and one atmosphere external barometric pressure. [5.3.3]

ASTM F 1112: Precautions

- *Extraneous Leaks* – This test method measures the decrease in the contained air pressure within a tire. This is a slow process that is very sensitive to air loss paths other than through the tire itself.
- *Test Temperature* – The inflation pressure loss through a tire structure is both a physical and chemical process. As such, test temperature variation creates noise within the data that is only partially accounted for within the test method.
- *Barometric Pressure* – The difference in pressures between the inflation gas contained within the tire structure and that in the surrounding environment provides the energy to drive the air molecules through the tire structure. Both the internal and external pressures must be accurately measured.
- *Time* – This is a slow process that is initially nonlinear in nature. Measurements must be taken over a sufficient time period in order to accurately discern the steady-state loss rate.

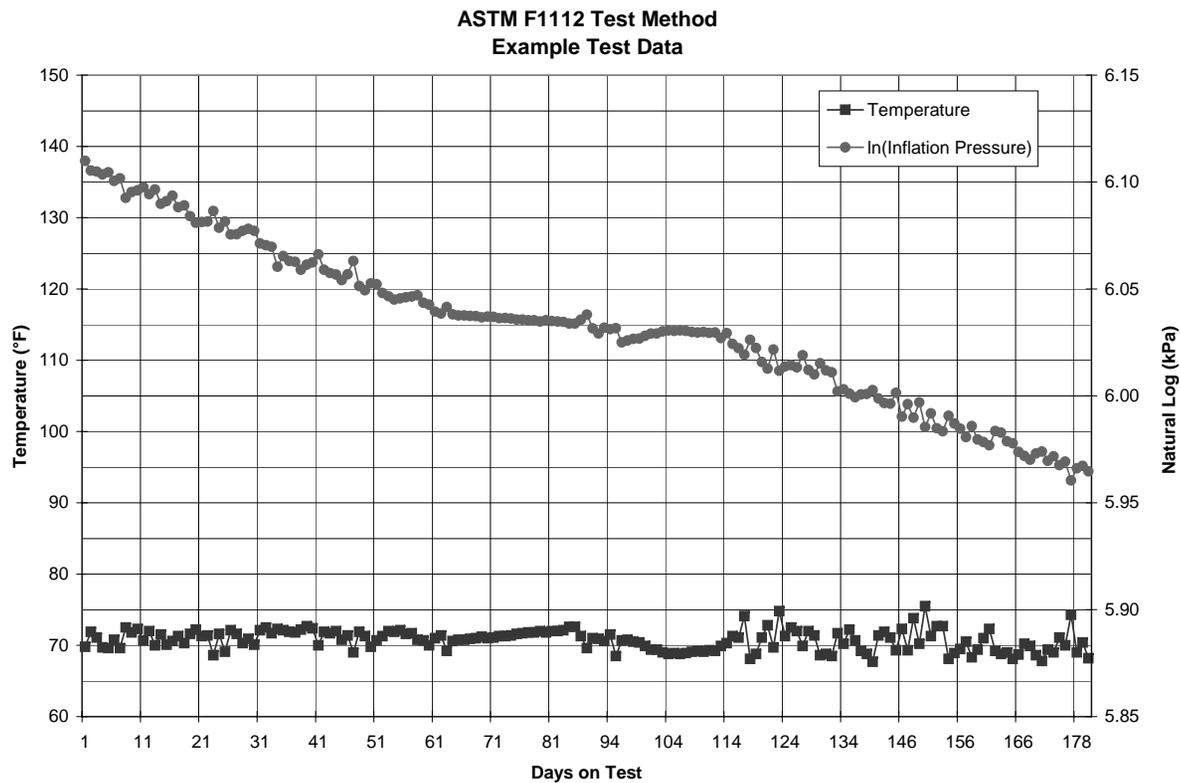
ASTM F 1112: Summary of Test Method

- At least two (2) tires are mounted and instrumentation attached to the test assemblies.
- Assemblies, including instrumentation, are carefully checked for leaks.
- Data is collected over a period of time. Six months (180 days) is recommended unless sufficient data exists to justify shorter data collection period is acceptable.
- Measured test data is normalized, accounting for fluctuations in test temperature and barometric pressure.
- The inflation pressure loss rate is calculated from the stabilized test data.
- The inflation pressure loss rate is then presented loss rate at the nominal test temperature and one atmosphere of barometric pressure.

ASTM F 1112: Precision and Bias

- Repeatability and Reproducibility have equivalent application statements within the test standard based on the limited data set available to determine these metrics.
 - Repeatability – The repeatability, r , of this test method has been established as 0.68 percent/month.
 - Reproducibility – The reproducibility, R , of this test method has been established as 0.68 percent/month.
- Bias – Bias is indeterminate for this test method because a reference, or true value, cannot be determined.

ASTM F 1112: Data Example



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THANK YOU

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