

Trace Moisture Measurement in Racing Car Tyres

Application Note



Attention to detail is paramount in the demanding arena of motor sports. Among the many factors influencing performance, the trace moisture content in high-performance racing car tyres is a critical yet frequently underestimated consideration.

This application note examines the importance of accurately measuring and maintaining low moisture levels in tyres, outlines the detrimental effects of elevated moisture content and discusses the techniques employed to monitor and control moisture levels effectively.

The Impact of Moisture on Tyre Performance

Moisture content in racing car tyres plays a significant role in overall performance. Trace amounts of moisture can influence how a tyre behaves, impacting grip, handling and the car's ability to perform consistently. Controlling moisture content is therefore essential for many reasons.

Fluctuations of Tyre Pressure: Moisture inside tyres can vaporise when exposed to the high temperatures generated during a race. This vaporisation leads to fluctuations in tyre pressure, which can compromise the stability needed for consistent performance and precise handling. Maintaining stable tyre pressure is critical for drivers to achieve ideal results on the track.

Sensor Performance: While the monitoring sensors located in each wheel are typically well-sealed and protected, environmental factors such as moisture can still interfere with the operation of the IR temperature sensors potentially causing issues.



Image courtesy of Wayne Taylor Racing

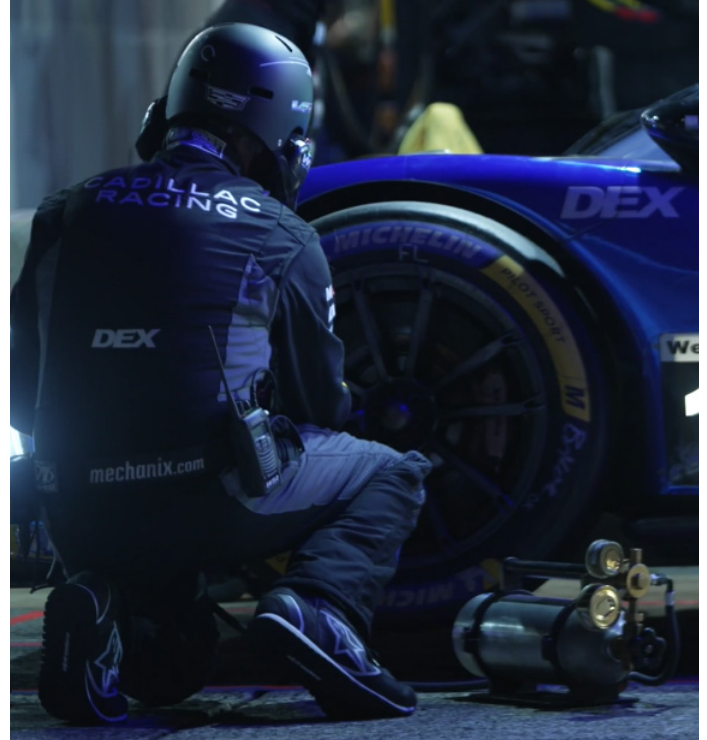


Image courtesy of Wayne Taylor Racing

Application Requirements

To accurately measure trace moisture in racing car tyres, teams must meet several application requirements:

Use of Sensitive Moisture Meters: Using high-precision hygrometers capable of detecting low moisture levels inside the tyre to ensure reliable readings.

Controlled Sampling Procedures: Bleeding a small, representative air sample from the tyre without depressurising it or contaminating the sample, maintaining the tyre's integrity and gas composition.

Consistent Measurement Protocols: Standardising the sequence and method of measurements (e.g., always sampling from the same tyre position and at similar conditions) to ensure repeatability and comparability across sessions.

Calibration and Maintenance: Regularly calibrating measurement devices before each session to maintain accuracy and perform routine checks to prevent sensor drift or malfunction.

Environmental Controls: Storing tyres in dry, well-ventilated areas before use minimises ambient moisture absorption and avoids exposing tyres to humid conditions as ambient moisture can enter the tyre cavity during mounting.

Data Recording: Systematically logging all moisture readings along with relevant environmental and tyre data for analysis and performance tuning.

Key Factors

Dewpoint Measurement

A fundamental method for evaluating moisture levels. By determining the dewpoint, operators can accurately assess the amount of water vapour present and ensure that the air meets the required standards for specific applications. Reliable dewpoint monitoring is essential for maintaining system efficiency and preventing issues caused by excess moisture.

Sensor Technology

Advanced sensor technologies are critical for precise moisture measurement. Instruments featuring aluminium oxide sensors provide high accuracy and reliability, making them ideal for monitoring dewpoint levels in high-performance racing tyres. These innovative sensors enable operators to maintain ideal performance and avoid moisture related problems.

Calibration and Service

Regular calibration and servicing of dewpoint instruments is necessary to ensure their ongoing accuracy and reliability. Proper maintenance minimises measurement errors, extends the lifespan of sensors and ensures consistent performance in moisture monitoring. This proactive approach helps maintain system integrity and prevents any costly downtime or equipment damage.

System Design

Optimising system design is crucial for effective moisture management. Selecting the appropriate trace moisture measurement instrument for your specific application enhances overall efficiency and helps identify potential moisture issues before they impact operations.

The Impact of Moisture

Moisture can have significant consequences on both equipment and performance. For example, excessive tyre pressure caused by vaporised moisture can reduce the contact patch, leading to a loss of grip and diminished performance. By understanding and controlling these impacts, tyre pressures can be set consistently and accurately, ensuring optimal results every time.



Image courtesy of Wayne Taylor Racing



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Process Solutions

Track Side Monitoring

Implementing track side monitoring is crucial for accurate trace moisture measurement in racing car tyres. Using a hygrometer to measure the moisture content in the gas within the tyre is a key step. Handheld hygrometers provide instant, on-site readings, delivering accurate and repeatable results. This immediate feedback allows operators to quickly identify and address any moisture related issues, supporting proactive maintenance and minimising the risk of performance problems during races.

Regular Maintenance

Routine maintenance and calibration of dewpoint instruments are essential for maintaining long-term accuracy and reliability. Scheduling regular checks and calibration procedures prevents sensor drift and ensures that equipment continues to deliver precise data. This proactive maintenance strategy extends the lifespan of sensors and reduces the risk of unexpected failures or inaccurate readings, thereby supporting consistent tyre performance.

Data Analytics

Utilising data analytics, further enhances system optimisation. By analysing data collected from moisture sensors and monitoring systems, operators can identify patterns, predict potential issues and make informed decisions to improve overall performance. This data-driven approach enables continuous improvement of moisture monitoring strategies, resulting in more efficient operations and better allocation of resources.

By combining real-time monitoring, regular maintenance and data analytics, racing teams can effectively manage trace moisture in tyres, ensuring ideal performance and reliability on the track.

Suitable Products



Dewpoint Sensor



Handheld Hygrometers



We design and manufacture dewpoint instruments for many different applications.

For advice, choosing the right product for your application, please contact us:

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