



BLOG

INDOOR AIR QUALITY INFLUENCES CHILDREN'S WELFARE

The increasing record of upper airway and respiratory tract diseases in vulnerable groups, such as children, imposed that governing legislation on non-residential IAQ standards with a child presence would be subject to regulatory reinforcement in order to improve the environmental conditions offered in institutions such as kindergartens and day care centers.

Indoor air quality (IAQ) has been subject of studies by various entities with different purposes, but they all bear witness to its relevance to the quality of life of the occupants of the monitored environments.

It is well known that IAQ is a major fact in the quality of life of children occupying buildings and may have significant implications for their health. The increasing record of upper airway (nose, ear and throat) and respiratory tract (trachea, bronchial and lungs) diseases in vulnerable groups, such as children, imposed that governing legislation on non-residential IAQ standards with a child presence would be subject to regulatory reinforcement in order to improve the environmental conditions offered in institutions such as kindergartens and day care centers. Considering that modern society spends 80% to 90% of its time indoors, the risk of contamination increases considerably. In this context, national and international bodies have established programs and guidelines that align to achieve an improvement of the environmental conditions of these buildings.

In Portugal, the **Portuguese Environment Agency** provided a **technical guide** related to the IAQ. On the international scene, a reference entity on the subject, the **Environmental Protection Agency** has devised an example **guide** for IAQ in the school environment. The **World Health**

Organization has also published a [paper](#) with guidelines on the effect of moisture and mold on IAQ patterns.

Indoor air pollution boils down to an interaction of physical, chemical and biological elements with ventilation systems, responsible for air renewal and space occupants.

The source of indoor air pollution is focused on indoor and outdoor sources. Indoor air pollutants that have the most interference on air quality levels and are most susceptible to analysis are carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM), air temperature, relative humidity and carbon dioxide (CO₂). Some of these are referred to in the [pollutant guide](#) provided by the **World Health Organization**.

Pollutants	Emission sources
Carbon dioxide (CO ₂)	Human presence, burning of fossil fuels (gas, heaters)
Volatile organic compounds (VOCs)	Paints, cleaning products, markers, glues, furniture
Carbon monoxide (CO)	Stoves, gas heaters, water heaters
Particulate matter (PM)	Smoke, air entrances, water residues, cleaning

Table 1 – Examples of air polluting sources

Monitoring these environments with high child presence reveals awareness of the importance of providing good IAQ in their present and future health levels. Health effects proved to be related to IAQ include asthma, bronchitis, nausea, conjunctivitis, cough, headache, and throat, and others that do not manifest themselves as clearly as nervous system problems, skin problems, and other respiratory problems.

Recording the values of compounds to which children are exposed helps to control them so that the maximum concentration values set by national and international agencies are not exceeded. We focus our attention on the temperature, humidity and CO₂.

We observed these 3 variables as the ones that reflect the most and that are most actively involved with the feeling of comfort prompted from IAQ. It is easier to immediately identify and feel any change in temperature, humidity or CO₂ values than in any of the other pollutants.

Tekon Electronics has researched, developed and placed on the market for monitoring solutions, the **DUOS** family products, organized in a distinct way to meet the specificity of each of the above variables and to establish the highest level of monitoring accuracy as strict as possible.

Temperature was the quantity that was defined as the introductory basis for the development of solutions, which were coupled by monitoring variables with direct association such as **humidity** and **CO₂**.

In order to respect and improve the monitoring process, this responsibility challenged the technical team to provide the configuration software, with necessary properties that, when appropriate, perform a calibration process of the probes responsible for **humidity** and **CO₂** registration. We addressed the relevance of calibration in monitoring in our previously published article about **CO₂ measurement error** and what improvements it adds to solution performance.

Rearranging the collected data is critical to completing and yielding the monitoring process. **Tekon IoT Platform** is a technology designed for this purpose. Viewing data in real time with an intuitive interface through a time graph expresses a deeper view of the levels recorded in each parameter. Setting log spans is a feature that allows users to stipulate how often temperature, humidity and CO₂ levels are collected in this case. The relevance of the theme benefits from this particularity in that it allows a tighter or wider control depending on the areas monitored. Interpretation of data is a fundamental part of the process of improving plant performance. **Tekon IoT Platform** allocates in its technical capabilities the possibility of designing an alarmistic system based on caveats set by limit values, to notify users when records match the stipulated limitations. At times of higher flow, this feature is a safeguard in ensuring yield ratios and QAI monitoring.

The integration of **DUOS** family products into **Tekon IoT Platform** is a unified tool for reporting recorded data so that the user can assess and analyse the circumstances under which his facilities is operating.

The data manifest themselves as an essential asset in taking preventive or predictive measures with access to the statistical profile of the monitored environment.

FINAL ACHIEVEMENTS

The natural vulnerability of children means that in order to protect their quality-of-life indices, including concerns about their health, children's environments must be properly monitored as they may be providing air contaminated with various pollutants that are have been scientifically proven to cause infections in the organism of this risk group.

We consider IAQ indices to be a catalyst for a more empowered future, where children today committed to measures that ensure comfort and air quality will benefit from the reduction of clinical complications that may impact their performance and quality of life.