

NOVEMBER 2021

# REPORT AIR QUALITY

Prepared For: Confidential Client

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## METHODOLOGY

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MasterMind · Tech technology is aimed at improving the health and comfort of customers and employees in indoor facilities through air quality management. For this purpose, the system monitors four air parameters to generate an Air Quality Index (AQI).

The content of this report provides the client with a point-by-point view of the air quality in each space, allowing alert conditions to be identified in order to adopt the appropriate corrective measures.

This report does not replace other analysis procedures such as audits. However, it builds its indicator based on technical criteria from recognised sources in the field, applying specific legal regulations (RITE).





## 1. HISTORICAL RECORD OF DATA

The data used for the analysis in the report have been obtained for 19 days by exporting them to the platform, taking 09/11/2021 as the start date and 27/11/2021 as the end date. These data are organised in tables (shown in the Annexes), consisting of four parameters (CO<sub>2</sub>, VOCs, temperature and humidity) for each measurement and the exact date on which they were taken. An example table is shown in this chapter.

The data graphs shown in the following chapter are built from the tables mentioned in the previous paragraph, obtaining four graphs, one for each measured variable.

Date and Time	CO2 (ppm)	TVOC (ppb)	Temperature (°C)	Humidity (%)
2021-11-30 14:36:03	990.00	88.00	27.00	67.50
2021-11-30 14:06:01	1007.00	90.00	27.10	67.80
2021-11-30 13:35:59	996.00	89.00	27.30	67.70
2021-11-30 13:05:57	1082.00	95.00	27.00	68.80
2021-11-30 12:35:54	1098.00	97.00	27.20	69.00
2021-11-30 12:05:50	1251.00	111.00	26.80	72.80
2021-11-30 11:35:47	1292.00	117.00	26.80	74.20
2021-11-30 11:05:45	1254.00	111.00	26.90	73.00
2021-11-30 10:35:42	1146.00	100.00	26.50	72.30
2021-11-30 10:05:40	976.00	87.00	26.50	71.40
2021-11-30 09:35:38	867.00	74.00	26.90	66.50
2021-11-30 09:05:37	857.00	73.00	26.90	64.40
2021-11-30 08:35:35	850.00	71.00	26.90	65.70
2021-11-30 08:05:33	819.00	66.00	26.90	64.20
2021-11-30 07:35:32	759.00	55.00	27.10	60.90
2021-11-30 07:05:29	730.00	50.00	26.90	57.50
2021-11-30 06:35:29	728.00	49.00	27.00	59.80
2021-11-30 06:05:28	729.00	49.00	26.80	60.60
2021-11-30 05:35:24	727.00	49.00	26.80	59.50
2021-11-30 05:05:23	711.00	46.00	26.90	58.70
2021-11-30 04:35:23	713.00	46.00	27.00	59.10
2021-11-30 04:05:22	723.00	48.00	26.60	60.50
2021-11-30 03:35:20	726.00	49.00	26.60	61.50
2021-11-30 03:05:19	720.00	47.00	26.50	62.80
2021-11-30 02:35:18	724.00	48.00	26.60	67.00
2021-11-30 02:05:17	712.00	46.00	26.40	68.20
2021-11-30 01:35:16	732.00	50.00	26.80	65.20
2021-11-30 01:05:13	730.00	50.00	26.50	68.20
2021-11-30 00:35:11	748.00	53.00	27.00	65.90



## 2. DATA GRAPHS

CO<sub>2</sub>



### VOCs



### Temperature



### Humidity





# **3. DATA ANALYSIS**

### WE HAVE ACHIEVED OUR GOAL, BUT ARE WE EFFECTIVE?

		EQUIPI	MENT 1			
Uninstallation date   -   Cooling   Heat pump     Activity location   Swimming pool   Heating   Heat pump     Equipment location   West wall   Dehumidification   Yes     Authorised capacity   75 persons   Other   No     Average number of people/day   50 persons   At peak times, the opening of windows is insufficient to reduce CO2 levels     Average stay per person   30 minutes   GOOD     Parameters   Maximum records   Minimum records   Average (30 days)   Index     PPM CO2   1,764   358   761   Acceptable     PPB VOcs   398   0   50   Good     Temperature (°)   29   22   27   Good     Huninitity (%)   70   36   60   Acceptable     Frequency   PPM CO2   Maximum user attendance   Daily (17:00 - 21:     PPM CO2   Maximu user attendance   Daily (17:00 - 21:   PPH VOC     PPM CO2   Maximu user attendance   Daily (17:00 - 21:   Never     PPM CO2   Maximu user attendance   Daily (17:00 - 21:   Never     PPM CO2   Opening	Code	******	On-site systems:			
Activity location   Swimming pool   Heating   Heat pump     Equipment location   West wall   Dehumidification   Yes     Authorised capacity   75 persons   Other   No     Average number of people/day   50 persons   At peak times, the opening of windows is insufficient to reduce CO2 levels     Average stay per person   30 minutes   GOOD     Parameters   Maximum records   Minimum records   Average (30 days)   Index     PPM CO2   1,764   358   761   Acceptable     PPB VOCs   398   0   50   Good     Temperature (°)   29   22   27   Good     Mumidity (%)   70   36   60   Acceptable     Incidents (with or without system warning)   Frequency   Frequency     PPM CO2   Maximum user attendance   Daily (17:00 - 21:   PPM CO2     PPM CO2   Maximum user attendance   Never   Never     PPM CO2   Maximu user attendance   Never   Never     PPM CO2   Maximum user attendance   Never   Never     Corrective measures   Efficiency   Never	Installation date	2021-10-05 18:32:53	Ventilation	Natural / Heat pump		
Equipment location   West wall   Dehumidification   Yes     Authorised capacity   75 persons   Other   No     Average number of people/day   50 persons   At peak times, the opening of windows is insufficient to reduce CO2 levels     Average stay per person   30 minutes   GOOD     Parameters   Maximum records   Minimum records   Average (30 days)   Index     PPM CO2   1,764   358   761   Acceptable     Good   PPB VOCs   398   0   50   Good     Temperature (°)   29   22   27   Good     Humidity (%)   70   36   60   Acceptable     Delive (11)   1ncidents (with or without system warning)   Frequency   Prequency     PPM CO2   Maximum user attendance   Deliv (17:00 - 21:   Deliv (17:00 - 21:     PPM CO2   Maximum user attendance   Never   Never     Humidity (%)   -   1   Never     PPM CO2   Maximum user attendance   Never   Never     Corrective measures   Efficiency   Never   Never     Humidity (%)   -	Uninstallation date	-	Cooling	Heat pump		
Authorised capacity     75 persons     Other     No       Average number of people/day     50 persons     At peak times, the opening of windows is insufficient to reduce CO2 levels     At peak times, the opening of windows is insufficient to reduce CO2 levels       Average stay per person     30 minutes     At peak times, the opening of windows is insufficient to reduce CO2 levels     GOOD       Parameters     Maximum records     Minimum records     Average (30 days)     Index       PPM CO2     1,764     358     Acceptable     Good       Temperature (°)     29     22     Good     Good       Itemperature (°)     70     36     Acceptable     Acceptable       Define through	Activity location	Swimming pool	Heating	Heat pump		
Average number of people/day     50 persons     At peak times, the opening of windows is insufficient to reduce CO2 levels       Average stay per person     30 minutes     GOOD       Parameters     Maximum records     Minimum records     Average (30 days)     Index       PPM CO2     1,764     358     Acceptable     Good       PPB VOcs     398     0     Good     Good       Temperature (°)     29     22     277     Good       Humidity (%)     70     36     60     Acceptable       PPM CO2     Maximum user attendance     Daily (17:00 - 21:     PPM CO2       PPM CO2     Maximum user attendance     Daily (17:00 - 21:     Daily (17:00 - 21:       PPM CO2     Maximum user attendance     Never     Daily (17:00 - 21:       PPM CO2     Maximum user attendance     Never     Never       Temperature (°) -     Corrective measures     Efficiency     Never       Humidity (%) -     Corrective measures     Efficiency     Never       PPM CO2     Opening windows     Insufficient     Insufficient       PPM CO2     <	Equipment location	West wall	Dehumidification	Yes		
Average stay per person   30 minutes   levels   GOOD     Parameters   Maximum records   Minimum records   Average (30 days)   Index     PPM CO2   1,764   358   761   Acceptable     PPB VOCs   398   0   50   Good     Temperature (°)   29   22   27   Good     Humidity (%)   70   36   60   Acceptable     Incidents (with or without system warning)   Frequency   Prequency     PPM CO2   Maximum user attendance   Daily (17:00 - 21:   Daily (17:00 - 21:     PPB VOCs   Maximum user attendance   Daily (17:00 - 21:   Daily (17:00 - 21:     PPB VOCs   Maximum user attendance   Never   Never     Humidity (%)   -   Never   Never     Temperature (°)   -   Never   Never     Humidity (%)   -   Never   Efficiency     PPM CO2   Opening windows   Insufficient   Nsufficient     PPM CO2   Opening windows   Insufficient   Insufficient     PPB VOCs   Opening windows   Insufficient   Insufficient	Authorised capacity	75 persons	Other	No		
Average skay per personSo minutesConstructionGOODParametersMaximum recordsMinimum recordsAverage (30 days)IndexPPM CO21,764358Average (30 days)IndexPPB VOCs398050GoodTemperature (°)292227GoodHumidity (%)703660AcceptableIncidents (with or without system warning)FrequencyPPM CO2Maximum user attendance0aily (17:00 - 21:PPB VOCsMaximum user attendance0aily (17:00 - 21:PPB VOCsMaximum user attendance0aily (17:00 - 21:PPB VOCsMaximum user attendanceNeverImperature (°)-Incert NeverFefficiencyNeverNeverPPM CO2Opening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientTemperature (°)Temperature (°)InsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening windowsInsufficientPPB VOCsOpening window	Average number of people/day	50 persons	At peak times, the opening			
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Humidity (%)   TO   36   Acceptable     Incidents (with or without system warning)   Frequency     PPM CO2   Maximum user attendance   Daily (17:00 - 21:     PPB VOCs   Maximum user attendance   Daily (17:00 - 21:     Temperature (°)   -   Image: Corrective measures   Never     Humidity (%)   -   Image: Corrective measures   Efficiency     PPM CO2   Opening windows   Image: Corrective measures   Efficiency     PPB VOCs   Opening windows   Image: Corrective measures   Sufficient     PPB VOCs   Opening wi	PPB VOCs	398	0	50	Good	
Incidents (with or without system warning)   Frequency     PPM CO2   Maximum user attendance   Daily (17:00 - 21:     PPB VOCs   Maximum user attendance   Daily (17:00 - 21:     Temperature (°)   -   Never     Humidity (%)   -   Never     Efficiency     PPM CO2   Opening windows   Insufficient     PPB VOCs   Opening windows   Insufficient     PPB VOCs   Opening windows   Sufficient     Temperature (°)   Thermostat increase   Sufficient	Temperature (°)	29	22	27	Good	
PPM CO2Maximum user attendanceDaily (17:00 - 21:PPB VOCsMaximum user attendanceDaily (17:00 - 21:Temperature (°)-NeverHumidity (%)-NeverEfficiencyEfficiencyPPM CO2Opening windowsPPB VOCsOpening windowsInsufficientTemperature (°)Thermostat increaseSufficient	Humidity (%)	70	36	60	Acceptable	
PPB VOCs   Maximum user attendance   Daily (17:00 - 21:     Temperature (°)   -   Never     Humidity (%)   -   Never     Corrective measures   Efficiency     Efficiency     PPM CO2   Opening windows   Insufficient     PPB VOCs   Opening windows   Insufficient     Temperature (°)   Thermostat increase   Sufficient	Incidents (with or without system warning)					
Temperature (°) - Image: New Pression of the second secon	PPM CO2	Maximum user attendance			Daily (17:00 - 21:00)	
Humidity (%) - Image: New problem set of the	PPB VOCs	Maximum user attendance			Daily (17:00 - 21:00)	
Corrective measures     Efficiency       PPM CO2     Opening windows     Insufficient       PPB VOCs     Opening windows     Insufficient       Temperature (°)     Thermostat increase     Sufficient	Temperature (°)	-			Never	
PPM CO2   Opening windows   Insufficient     PPB VOCs   Opening windows   Insufficient     Temperature (°)   Thermostat increase   Sufficient	Humidity (%)	-			Never	
PPB VOCs   Opening windows   Insufficient     Temperature (°)   Thermostat increase   Sufficient	Corrective measures					
Temperature (°) Thermostat increase Sufficient	PPM CO2	Opening windows			Insufficient	
	PPB VOCs	Opening windows			Insufficient	
Humidity (%) Dehumidifier Sufficient	Temperature (°)	Thermostat increase			Sufficient	
	Humidity (%)	Dehumidifier			Sufficient	

General observations: With the modification of the Regulation of Thermal Installations in Buildings due to Covid-19, it is mandatory to comply with the IDA1 (designed for hospitals and laboratories) of +350ppm of CO2 and neither the IDA2 (swimming pools +500ppm)

nor the IDA3 (gymnasiums +800ppm).



# 4. ANNUAL SAVINGS

According to the carried out study<sup>\*</sup>, the company saw a reduction of 59,917€ per year (5,447€ per site)

\* The study contemplates a price/hour of personnel equal to the minimum interprofessional salary. The company purchases 10 units per centre, for a total of 11 centres.



# **5. RESULTS**

The data analysis shows that the highest CO<sub>2</sub> peak of the day occurs at approximately 20:00 hours. The pattern is repeated every day of the week, although at different intensities, with Tuesdays and Thursdays being the days with the highest CO<sub>2</sub> values. It is also observed that on Fridays, Saturdays and Sundays, CO<sub>2</sub> takes very uniform values, preventing the formation of the previously mentioned peak.

The ventilation of the spaces is observed to be significant and sufficient for most of the day, except at the points of maximum  $CO_2$  concentration. Ventilation of the spaces on Tuesdays and Thursdays at 20:00 hours becomes insufficient, although  $CO_2$  values decrease very considerably during this time.

Volatile Organic Compounds values increase and decrease in line with CO<sub>2</sub> values, which is logical and follows the expected behaviour.

As for temperature and humidity, the values of both parameters are significantly stable and are within the threshold of values considered to be correct, even though, in this case, the space is more prone to high humidity.

The study also detects a saving of approximately 1.5 hours per day per centre, compared to the manual methodology used previously. This time translates into a total saving of 59,917  $\in$  per year (11 centres) or 5,447  $\in$  per centre.



AIR QUALITY

#### CENTRALISATION AND INCREASED DATA VALIDITY



#### ANNUAL TIME AND MONEY SAVINGS



#### ENHANCED CUSTOMER TRUST AND COMFORT



# Master the Future

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