

# **Occupational Health And Safety - Application Of Requirements Of Legislation Decree 81/08 – Working Environment - Data Recording**

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The Application of Legislative Decree 81/08 requires that workplaces are subject to a certain amount of working environment analysis, performed in order to investigate workers exposure to physical agents (such as electromagnetic radiation, noise and vibration), biological agents, chemical substances and to check the adequacy of illumination, temperature, humidity and ventilation in the work places. A large number of data need to be recorded for each workplace. In order to improve the availability of these data and to permit a quick consultation, an organized system to store and analyse the data is necessary especially in large organisations with a significant number of offices distributed Nationally and Internationally. The paper presents the main features of a data base developed to collect data from different working environment investigations. This system could help companies with different facilities in order to control all the analysis results and to check and assure safe and healthy conditions in the working places.

## **1. Methodological Approach**

The continuous growing of interest about the safety of workers has caused, in different countries, the adoption proclamation of several laws having the aim of identifying and controlling the risks associated with work activities and workplaces.

In Italy the Legislative Decree 81 of 2008 and its subsequent modifications and integrations, regulates risk associated with workplaces. To this purpose, the law sets many tasks that must be performed by the employer such as issuing safety reports with regard to workplaces and working activities and informing and training workers about the risk associated with their working activities.

Legislative Decree 81 of 2008 requires also that all workplaces, e.g. offices or industrial buildings, must be subjected to a certain amount of environmental analyses. These environmental analyses are performed in order to investigate several parameters related with workplaces and with workers exposure to possible hazardous agents. Data collected during these analyses are then used in order to control the risks associated with the specific working environment.

Parameters analysed are: physical agents (such as electromagnetic radiation, noise, and vibration), biological agents, chemical substances.

Law requires also that employer have to check the adequacy of illumination, temperature, humidity and ventilation in the workplaces.

These working environment analyses must be performed periodically in order to monitoring continuously the real status of workplaces.

Following these environmental monitoring campaigns, companies need to store a large number of data concerning each workplace. A company managing several productive sites is obliged to perform several analyses of the different parameters over time, these analyses are repeated yearly. All these analyses generates a large number of data and several reports that shall be properly managed and analysed, to understand if something is changing over the time or if some action must be taken to reduce risk associated with work activity. As described before, the problem of manage this large number of document and reports and to control the real status of workplaces managing this large number of data, concerns mainly companies that have different productive sites distributed in the country or even abroad. It is important for the employer to access easily to all these data and to easily check all parameters also in order to verify the necessity of new monitoring campaign. In order to make easier to organize and to analyse data, a database designed in order to store all these data and to make their management easier has been developed. In the present paper, the main features of a Microsoft Office Access based database (WEMM Working Environment Measures Manager), developed with the aim of store easily data collected from different production units, is presented.

In order to allow the storage of values referred to different location, different monitoring campaign, and other peculiarity of the environmental analyses, to allow an easy and timely control of the situation of workplaces, each datum/value inserted in WEMM database shall be associated with:

- workplace where the analysis is performed (building, production unit);
- specific place inside the building (floor, room, office);
- date when the analysis is performed;
- reference of report where data are reported;
- assessment of data acceptability;
- unit of measurement;
- range of existence and reference values to whom refer measures;
- note.

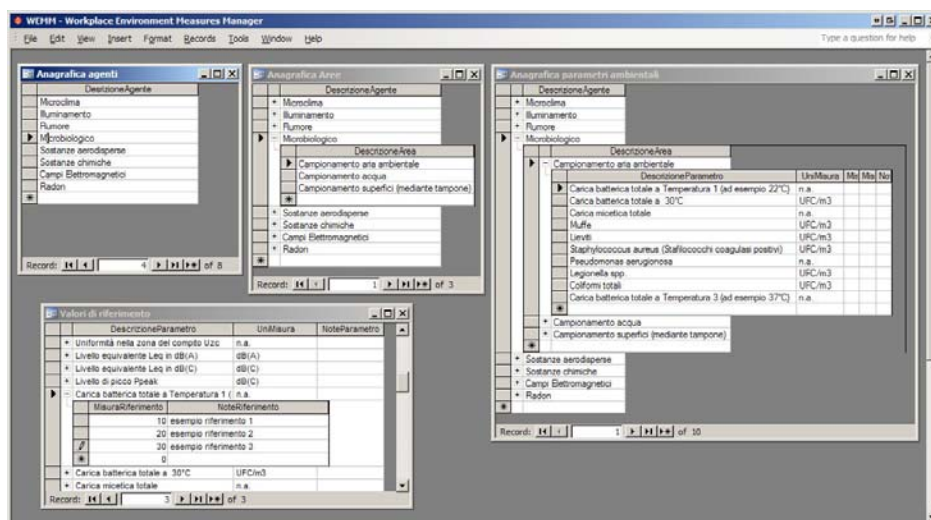
The following figure shows the input of the main parameters that are also used for the retrieval of data.

The screenshot shows the WEMM - Workplace Environment Measures Manager application window. The interface includes a menu bar (File, Edit, View, Insert, Format, Records, Tools, Window, Help) and a search section with the following fields and controls:

- Edificio: dropdown menu
- Piano/Chiostrina: dropdown menu
- Luogo: dropdown menu
- Relazione tecnica: dropdown menu
- Periodo dal: date picker
- al: date picker
- Ricerca testo nelle note delle misurazioni: text input field
- Agente: dropdown menu
- Area o elemento indagato: dropdown menu
- Parametro ambientale: dropdown menu
- Valutazione: dropdown menu

At the bottom, there are three buttons: "Visualizza tabella risultati", "Visualizza report dei risultati", and "Nuova ricerca". The logo "D'APPOLONIA" is located in the bottom right corner of the window.

It is important to remark that the database is developed with the aim to manage only environmental parameters; analyses related with personal exposure are not presently included, although these data could be necessary to collect when required. The aim of database is easier the task of collecting and presenting a large mass of data, without providing any elaboration. Analysis of the data is always possible by exporting the data to a spreadsheet. In order to easily consult the source of data, the database allows the user to browse a digital version of reports where it is possible to find data; these reports are stored in a dedicated directory. It is also possible to associate a judgement to each parameter. In this way it is possible to storage the judgments allowing the user to consult this information in an easier way, without have to consult the source reports. It is useful to be able to insert also the judgment in the database because in this way it is possible to control the situation of each workplace in order to define if there is a need of further actions, for example to substitute chemicals or define new operating procedure or new monitoring campaign. To avoid errors in the input of data, the Database presents the range of allowable values for each parameter, to avoid input of inconsistent values. The database also includes a list of reference values, in order to easily understand if the value is inside the acceptable range. The following figures show the list of parameters and the spreadsheet where it is possible to insert parameters, units of measurement and data acceptable range for each parameter.



The parameters that are inserted in the software are all those:

Microclimate:

- temperature dry bulb;
- temperature wet bulb;
- relative humidity;
- air speed;
- total air flow;
- air flow per person.

Illuminance:

- illuminance for point;
- minimum illuminance;
- average illuminance.

Noise:

- equivalent peak level.

Microbiological:

- bacterial load at 37°C;
- total micetic load;
- moulds;
- yeast;
- staphylococcus aureus;
- pseudomonas aeruginosa;
- legionella spp.;
- coliform bacteria.

Air pollutants:

- formaldehyde;
- dispersed particles;
- CO e CO<sub>2</sub>;
- O<sub>3</sub> e NO<sub>2</sub>.

Electromagnetic fields:

- electromagnetic induction;
- electric field strength;
- magnetic field.

Once data are inserted and stored in the WEMM database, different searches crossing freely any of the following parameters can be performed:

- building or units;
- floor;
- place;
- report;
- period (from, to);
- parameter;
- kind of parameter (noise, microclimate, etc);
- assessment;
- less than or equal to a value;
- more than or equal to a value.

Results of searches are then used to control the situation of environmental conditions of workplaces, to monitor if some parameter has a value not acceptable that require particular attention, to assess the time history of a given parameter, to check for similarities or correlations among various different locations etc.

Descrizione	DescrizioneArea	DescrizioneParametro	DescrizioneLuogo	DescrizionePec	DescrizioneEffetto	Misura	Unità	Giudizio	GiudizioNormale	DataMisura	NoteMisura	TestoDocumento
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3021E	Terzo piano ala e	27.00%	27	%	Non adeguato	Non adeguato	12/01/2006 14.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3024E	Terzo piano ala e	25.00%	25	%	Non adeguato	Non adeguato	12/01/2006 12.00.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3024E	Terzo piano ala e	24.00%	24	%	Non adeguato	Non adeguato	12/01/2006 14.50.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3027E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 09.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3027E	Terzo piano ala e	25.00%	25	%	Non adeguato	Non adeguato	12/01/2006 11.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3027E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 14.50.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3028E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 09.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3028E	Terzo piano ala e	25.00%	25	%	Non adeguato	Non adeguato	12/01/2006 11.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3028E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 14.50.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3024E	Terzo piano ala e	25.00%	25	%	Non adeguato	Non adeguato	12/01/2006 10.00.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3031E	Terzo piano ala e	27.00%	27	%	Non adeguato	Non adeguato	12/01/2006 11.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3049E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 14.40.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3032E	Terzo piano ala e	31.00%	31	%	Non adeguato	Non adeguato	12/01/2006 09.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3032E	Terzo piano ala e	27.00%	27	%	Non adeguato	Non adeguato	12/01/2006 11.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3032E	Terzo piano ala e	32.00%	32	%	Non adeguato	Non adeguato	12/01/2006 14.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3048E	Terzo piano ala e	31.00%	31	%	Non adeguato	Non adeguato	12/01/2006 09.55.00	porta aperta	Relazione sul sopralluogo effettuato presso g
Microclima	Campionamento ambientale per micr.	Umidità relativa	Stanza 3048E	Terzo piano ala e	28.00%	28	%	Non adeguato	Non adeguato	12/01/2006 11.50.00	porta aperta	Relazione sul sopralluogo effettuato presso g

The software can create also printable reports of the researches performed, and can export the data to be used with analysis spreadsheets, such as Microsoft Office Excel. In this way data can be graphically elaborated and statistical analyses can be performed.

In the following it is presented a type of report printable form data base.

Luogo	Parametro	Misura	Data Misura	Note Misura
3024E - Stanza	Umidità relativa	25 %	12/01/2006 10.00.00	porta aperta
3024E - Stanza	Umidità relativa	25 %	12/01/2006 12.00.00	porta aperta
3024E - Stanza	Umidità relativa	24 %	12/01/2006 14.50.00	porta aperta
3027E - Stanza	Umidità relativa	28 %	12/01/2006 09.55.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3027E - Stanza	Umidità relativa	25 %	12/01/2006 11.55.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3027E - Stanza	Umidità relativa	28 %	12/01/2006 14.50.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3028E - Stanza	Umidità relativa	28 %	12/01/2006 09.55.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3028E - Stanza	Umidità relativa	25 %	12/01/2006 11.55.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3028E - Stanza	Umidità relativa	28 %	12/01/2006 14.50.00	porta aperta (misura effettuata nell'ambiente 3027-28E)
3031E - Stanza	Umidità relativa	31 %	12/01/2006 09.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3031E - Stanza	Umidità relativa	27 %	12/01/2006 11.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3031E - Stanza	Umidità relativa	32 %	12/01/2006 14.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3032E - Stanza	Umidità relativa	31 %	12/01/2006 09.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3032E - Stanza	Umidità relativa	27 %	12/01/2006 11.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3032E - Stanza	Umidità relativa	32 %	12/01/2006 14.55.00	porta aperta (misura effettuata nell'ambiente 3031-32E)
3048E - Stanza	Umidità relativa	31 %	12/01/2006 09.55.00	porta aperta
3048E - Stanza	Umidità relativa	31 %	12/01/2006 11.50.00	porta aperta
3048E - Stanza	Umidità relativa	30 %	12/01/2006 14.40.00	porta aperta
3049E - Stanza	Umidità relativa	31 %	12/01/2006 09.50.00	porta aperta
3049E - Stanza	Umidità relativa	28 %	12/01/2006 11.55.00	porta aperta
3049E - Stanza	Umidità relativa	28 %	12/01/2006 14.40.00	porta aperta

Risultati della ricerca per: Parametro=Umidità relativa; Effetto=Non adeguato; Data=12/01/2006.  
Stampato in data 14/09/2009 14:55:36 Pagina 1 di 1

In order to preserve the integrity of data inserted on database, only authorised users are allowed to insert or modify data on database, all other users are able only to read data, do searches and print reports created by software.

Data entry screen is also organised in order to reduce as much as possible error in insertion of data, allowing user to choose among parameters without inserting anything that is not already foreseen.

## **2. Conclusion**

The Italian Legislative Decree 81 of 2008, like other similar laws in other countries, requires the employer to collect a large number of data on environmental monitoring of workplaces. This generates a huge number of data that shall be recorded and efficiently managed in order to perform workplace analyses. The WEMM database has been developed specifically with the needs of an Employer managing a number of different sites and offices in mind, with the aim of make easier consultation of data of environmental monitoring, with the final goal to have a clear vision of the real status of workplaces over time.

To this purpose, the database shall allow an easy and controlled interface for data input, to avoid errors in inputting of a huge number of data in database, and shall be easily adapted to different conditions of use (laboratories, offices, various production units). The data inserted shall also be preserved from manipulation that could cause erroneous changing of data already introduced in database.

WEMM Database is a help in checking safe condition in workplaces and in using data collected for different tasks allowing user to export data for subsequent elaborations.