Technical report

English version

Idromatic S.r.l.
Via Petrarca, 127
46034 – Borgo Virgilio (MN) -
Italy

Sanitation Test

STEAM CLEANER ENDURA 3K

Technical consultancy and drafting of this document by:

SYRIOS S.r.l. - Consulenza e formazione
Via M. Teresa di Calcutta 4/E – 46023 Gonzaga (MN)
Tel. e fax 0376/588053 - www.syrios.it – info@syrios.it

SUMMARY

ANNEX

ANNEX 1	**Analytical reports**	Reports of swabs analysis on surfaces before and after cleaning

1. Preface

This document describes the results of a sanitization test performed on 3 different types of surfaces, using ENDURA 3K steam cleaner, the steam generator produced by IDROMATIC S.r.l.

IDROMATIC S.r.l. is a company based in Borgoforte (MN), Italy with a thirty-year experience in the production of professional hot and cold high pressure cleaners. About six years ago, it started to invest mostly in the technology of industrial steam generators, reaching great results of innovation. Thanks to the know-how acquired in its long cleaning experience, the company emerges in the market for the quality of its products.

2. Test purpose

The sanitation test has the aim to verify the disinfection efficiency on different types of surfaces, using ENDURA 3K machine, simply by delivering steam.

The cleaner is able to clean and disinfect surfaces in three ways:

- steam supply;
- simultaneous supply of steam and chemical products;
- suction (even simultaneously with previous modes).

For the duration of the test, neither the use of detergent chemical products nor the suction function had been used: we only wanted to examine the sanitizing effects, obtained with the steam spray only.

3. Description of the test

3.1. Features of the steam cleaner ENDURA 3K

ENDURA 3K steam cleaner is an appliance designed for the production of steam and the vacuuming of liquids, detergents and poured solid particles.

The external structure of the cleaner is made of AISI 304 steel. On the upper part of the cleaner there is a dashboard including: indicator lights, thermostat, steam flow regulator, counter, pressure gauge to measure boiler pressure, etc. On the dashboard there is also the steam tube outlet, which you can connect different accessories (brushes, nozzles, etc.) to.

Inside the cleaner there are: a water tank, a tank for the detergent (which can be filled by means of special nozzles on the upper part) and a boiler, which allows the water to overheat and obtain steam.

In the back of the cleaner, there is a high density polyethylene tank for the recovery of the dirt.

The main technical features of ENDURA 3K are shown in the table here below.

Technical features of ENDURA 3K steam cleaner (code. 30.18.00100)		
Parameter	*Unit*	*Value*
Dimensions	mm	700x562x935
Maximum absorbed power	W	3000
Maximum working pressure	bar	7
Maximum boiler temperature	°C	200
Maximum working temperature	°C	165
Maximum steam flow rate	Kg/h	4,1

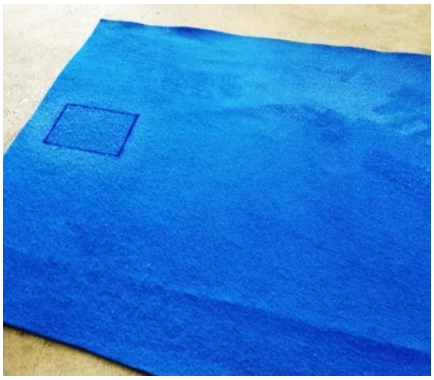
For all other technical data, refer to user and maintenance manuals of the machine.

3.2. Surfaces analyzed

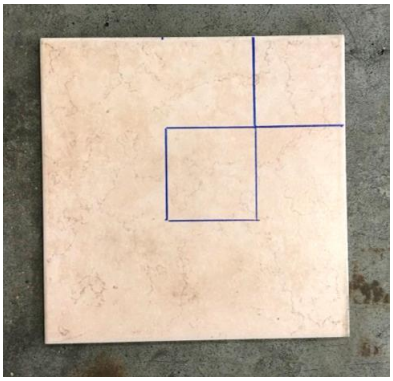
ENDURA 3K steam cleaner can be used for the cleaning and sanitation of different environments, in particular:

- industrial cleaning;
- hotel cleaning;
- kitchen cleaning;
- hospital cleaning;
- house cleaning;
- cleaning of animal equipment and environments;
- carpet cleaning;
- internal vehicle cleaning.

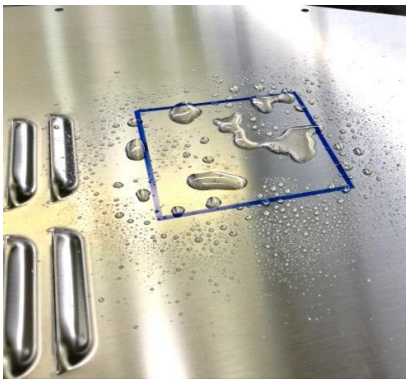
The test was conducted on three different surfaces: a carpet, a porcelain tile and a stainless steel panel.



Carpet



Porcelain tile

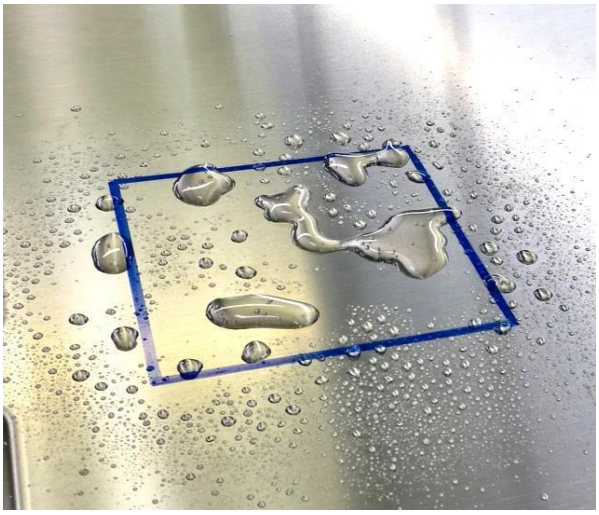


Stainless steel

These three surfaces can be considered the most representative places of steam machine use.
The carpets are in hotels and houses as well as the porcelain tiles while the stainless steel can be found in the professional kitchens and restaurants.

3.3. Methodology of analysis and type of contaminant

Using a marker, a 10 cm square has been traced to delimit a survey area of 100 cm2.
Once defined, the contaminant was applied to the survey area using a spray dispenser. The contaminant applied is waste water containing mesophilic aerobic microorganisms, escherichia coli, coliforms and aeruginosa pseudomonas.



Contaminated surface

Each sampling was carried out by means of a sterile rayon swab in compliance with ISO 18593: 2018 methods. The swabs were driven in such a way as to apply a good pressure and rotate, so that the entire surface of the pad came in contact with the contaminated surface. Each swab was rolled over the surface diagonally and horizontally. At the end of the sampling each swab was placed in the special test tube. The test tubes were then placed inside a portable refrigerator and then delivered to the laboratory for analysis.

The *count of mesophilic aerobic microorganisms* was performed in compliance of ISO 18593: 2018 and UNI EN ISO 4833-1: 2013; the analyzes on *Escherichia coli* and on *total coliforms* were carried out in compliance with ISO 18593: 2018 method together with AOAC 991.14 1994; analyzes on *psedomonas aeruginosa* were performed accordingly to ISO 13720: 1995.

Sampling and laboratory analyzes were performed by the Micro-B S.r.l. chemical and microbiological analysis laboratory.

4. Execution of the test

The test was conducted inside the company Idromatic S.r.l., with an internal room temperature of 18-19° C.

The first sampling was carried out immediately after contaminating the surface. In this way it was possible to establish the level of initial contamination of the surface.

For each surface, it was decided to pass the steam accessories on the contaminated area for three different times. After each time, we performed the sampling in compliance with the methods previously described. In this way it was possible to check the sanitizing action of the cleaner after the first, second and third passage. Therefore, for each surface, 4 samples were taken: one immediately after contamination and three after each clean-up step.

The surfaces were cleaned, as shown in the figure below, under the following operating conditions:

- Boiler temperature between 158 and 166 ° C;
- Working pressure between 5 and 7 bar.

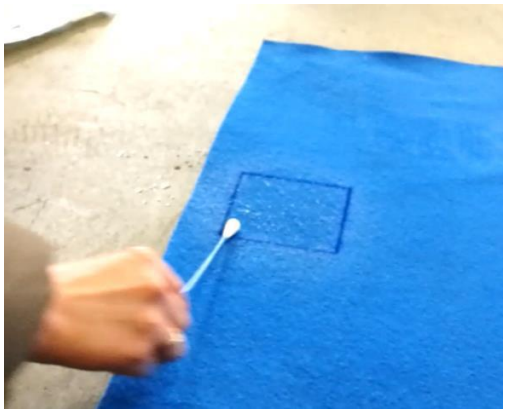
Temperature and pressure values of the cleaner during operation

The tested surfaces were cleaned using only the action of steam, using the L150 nozzle installed on the steam pipe. Therefore no detergents nor suction function were activate. The test was conducted only with steam spray. We choose to test the **L150 nozzle** because it can be used on the three types of surfaces analyzed. Normally, on the L150 nozzle a brush is installed but, during the course of the test, the brush was removed to be able to evaluate the steam cleaning action only.

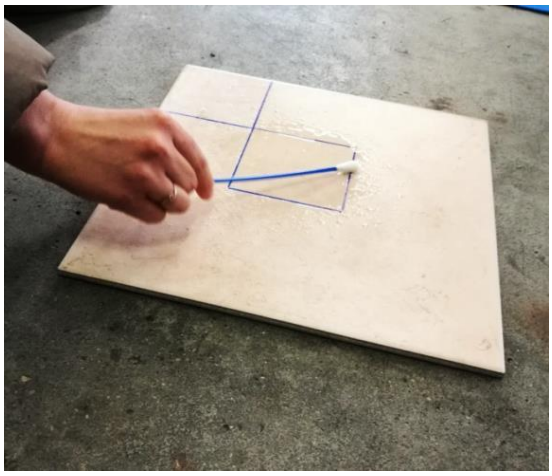
L150 Nozzle (without brushes)

During the test, the nozzle was kept at a distance of about 1 - 2 cm from the surfaces to be cleaned. Every single passage, on the 10x10 cm surface, lasted about 10 seconds.

The photos show cleaning phase and sampling for the different surfaces



Cleaning and sampling phase on the carpet



Cleaning and sampling phase on porcelein tile

Cleaning and sampling phase on stainless steel surface

3. Results

The results of the laboratory analyzes are shown in the tables below. Four steps are indicated:

- ***Step 0***: immediately after contaminating the surface, before the steam cleaning phase;
- ***Step 1***: after the first passage of the steam cleaner;
- ***Step 2***: after the second passage of the steam cleaner;
- ***Step 3***: after the third step of the steam cleaner.

*Surface : **CARPET***					
Sampling	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*	*Test report number*
Step 0	22	6	6	6	1900395-005
Step 1	2	<1	<1	<1	1900395-006
Step 2	2	<1	<1	<1	1900395-007
Step 3	<1	<1	<1	<1	1900395-008

NOTE: *the data shown in the table are expressed in UFC/cm2*

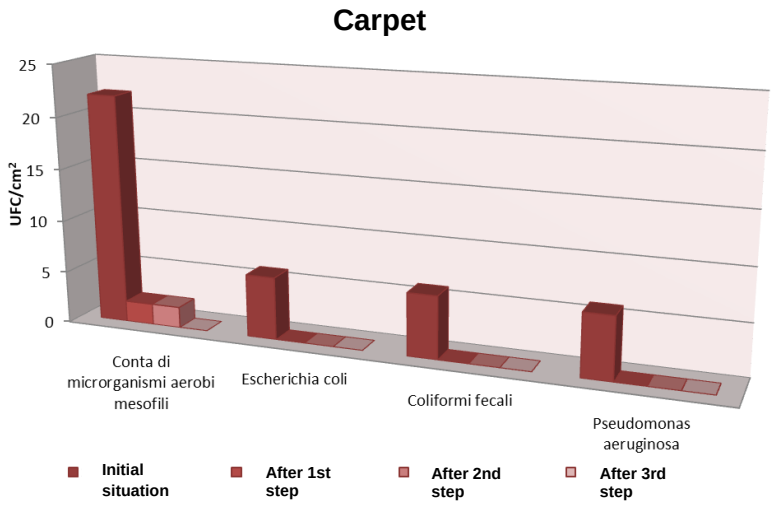
*Surface : **PORCELAIN TILE***					
Sampling	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*	*Test report number*
Step 0	21	5	5	9	1900395-001
Step 1	13	<1	<1	<1	1900395-002
Step 2	2	<1	<1	<1	1900395-003
Step 3	<1	<1	<1	<1	1900395-004

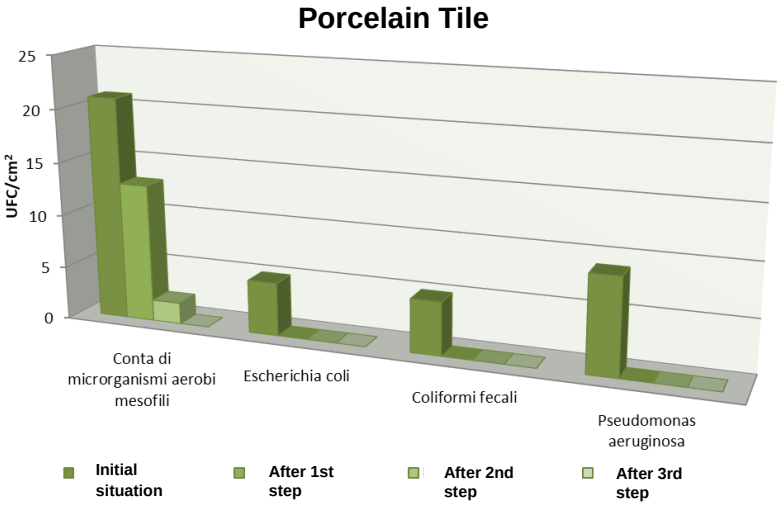
NOTE: *the data shown in the table are expressed in UFC/cm2*

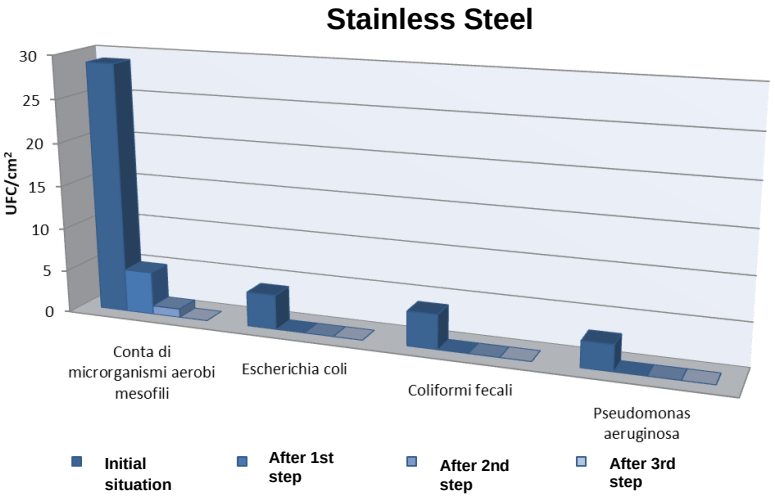
*Surface : **STAINLESS STEEL***					
Sampling	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*	*Test report number*
Step 0	29	4	4	3	1900395-009
Step 1	5	<1	<1	<1	1900395-010
Step 2	2	<1	<1	<1	1900395-011
Step 3	<1	<1	<1	<1	1900395-012

NOTE: *the data shown in the table are expressed in UFC/cm2*

Below there are three histograms, one for each surface investigated, which compares the indicators searched in the laboratory before and after each passage of the steam cleaner.







Note: where laboratory analyzes have given a value <1 (see tables above), in the graphs a value of 0 has been assumed as being lower than the value of detection

The tables below show the percentages of reduction of the various indicators sought in the laboratory, after each passage of the steam cleaner.

*Surface : **CARPET***				
Passages	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*
After 1st passage	90,9%	100%	100%	100%
After 2nd passage	90,9%	100%	100%	100%
After 3rd passage	100%	100%	100%	100%

*Surface : **PORCELAIN TILE***				
Steps	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*
After 1st passage	38,1%	100%	100%	100%
After 2nd passage	90,5%	100%	100%	100%
After 3rd passage	100%	100%	100%	100%

*Surface : **STAINLESS STEEL***				
Sampling	*Count of mesophilic aerobic microorganisms*	*Escherichia coli*	*Coliformi totali*	*Pseudomonas aeruginosa*
After 1st passage	82,8%	100%	100%	100%
After 2nd passage	96,6%	100%	100%	100%
After 3rd passage	100%	100%	100%	100%

5. Conclusions

The sanitation test aimed at the evaluation of the disinfection efficiency obtained by using the ENDURA 3K cleaner using the steam sanitizing action only.

The survey surfaces (carpet, tile, stoneware and stainless steel), after being contaminated, were cleaned using the L150 nozzle installed on the steam cleaner tube. The nozzle has been used without a brush; this means that the cleaning was not obtained by means of the mechanical action of the brush but exploiting exclusively the effect of steam. In all the three cases examined, after the third passage, all the microbial species investigated were substantially below the detection threshold.

The results of the study have shown that cleaning and sanitation, conducted with the experimental methods described, has shown an excellent efficiency in removing the contaminants applied to the surfaces investigated, from the first passage of the nozzle connected to the cleaner.