Proof of Concept ： Efficacy & Safety

JOKIN AIR®

Disinfectant to Bacteria, Deactivating Virus, and Deodorize the Air
by Choline Dioxide power!

ORIGAMI LONG

ORIGAMI MINI

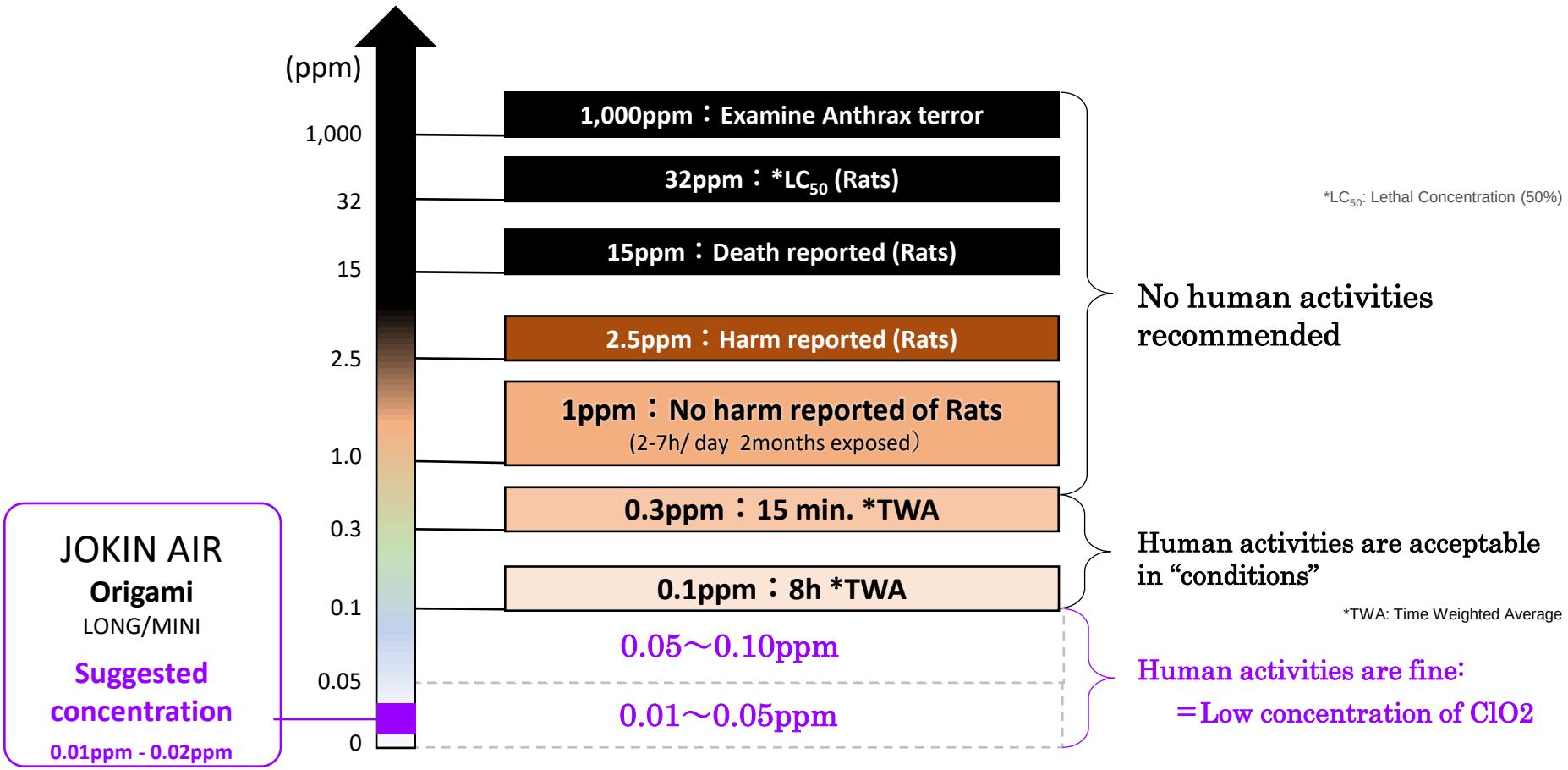
Revised : 11th January2022

DAIAN SERVICE INC.

20220001

● Suggested ClO2 concentration ： Fit with biological safety chart

Biological safety chart of ClO2 concentration



*LC_{50}: Lethal Concentration (50%)

*TWA: Time Weighted Average

Quoted：A new proposal for aerial disinfection by low concentration chlorine dioxide gas :Miura T., Shibata T. The Open Antimicrobial Agents Journal 2, 71-78 (2010).

● Purpose of the P.O.C. testing

・Prove the Efficacy in Safety concentration : JOKIN AIR Origami LONG/MINI

● Effective concentration？

・Effective to Bacteria

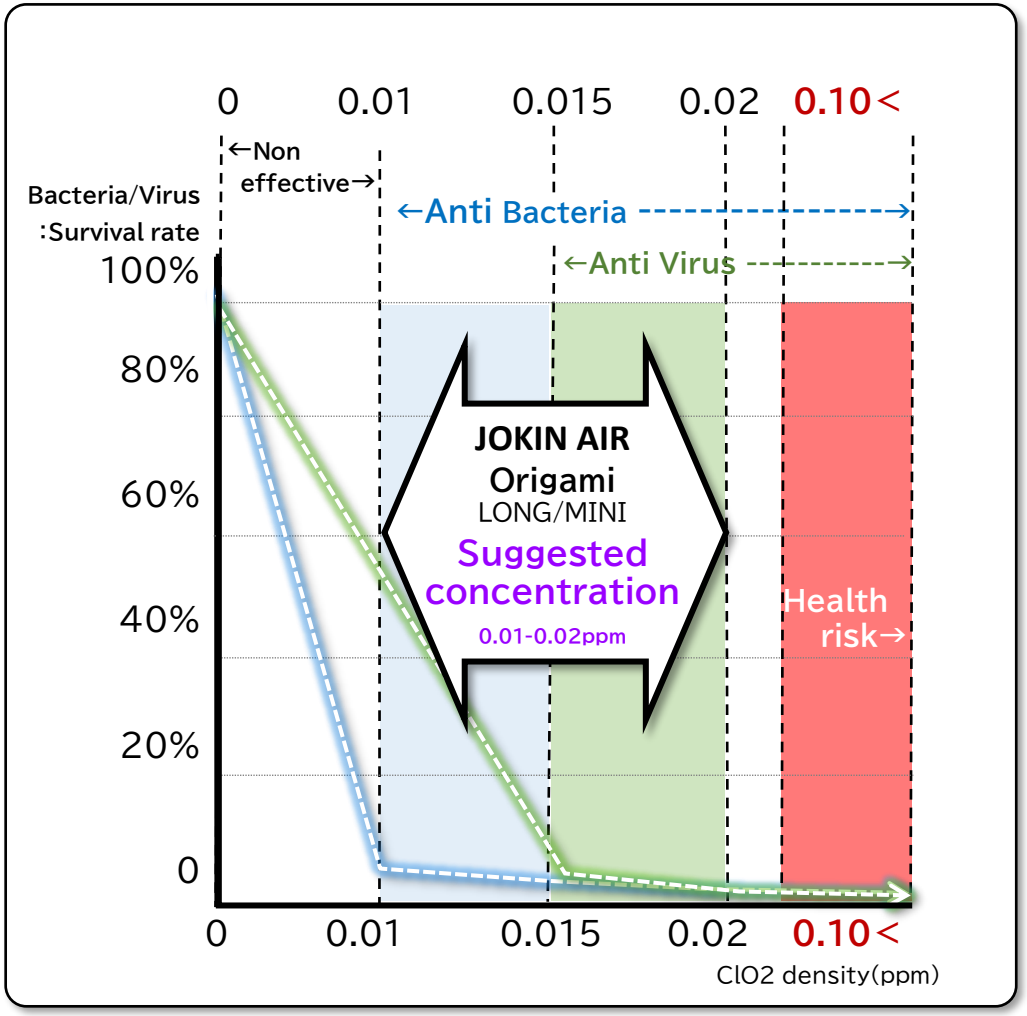
0.010ppm＜

・Effective to Virtus

0.015ppm＜

● Risky concentration to human health？

0.100ppm＜



● Summary of the P.O.C. test

① **Lab test : 0.04㎥ sealed box.**

： 0.004 - 0.200ppm

② Room test : 30㎥ room.

： 0.010 - 0.019ppm

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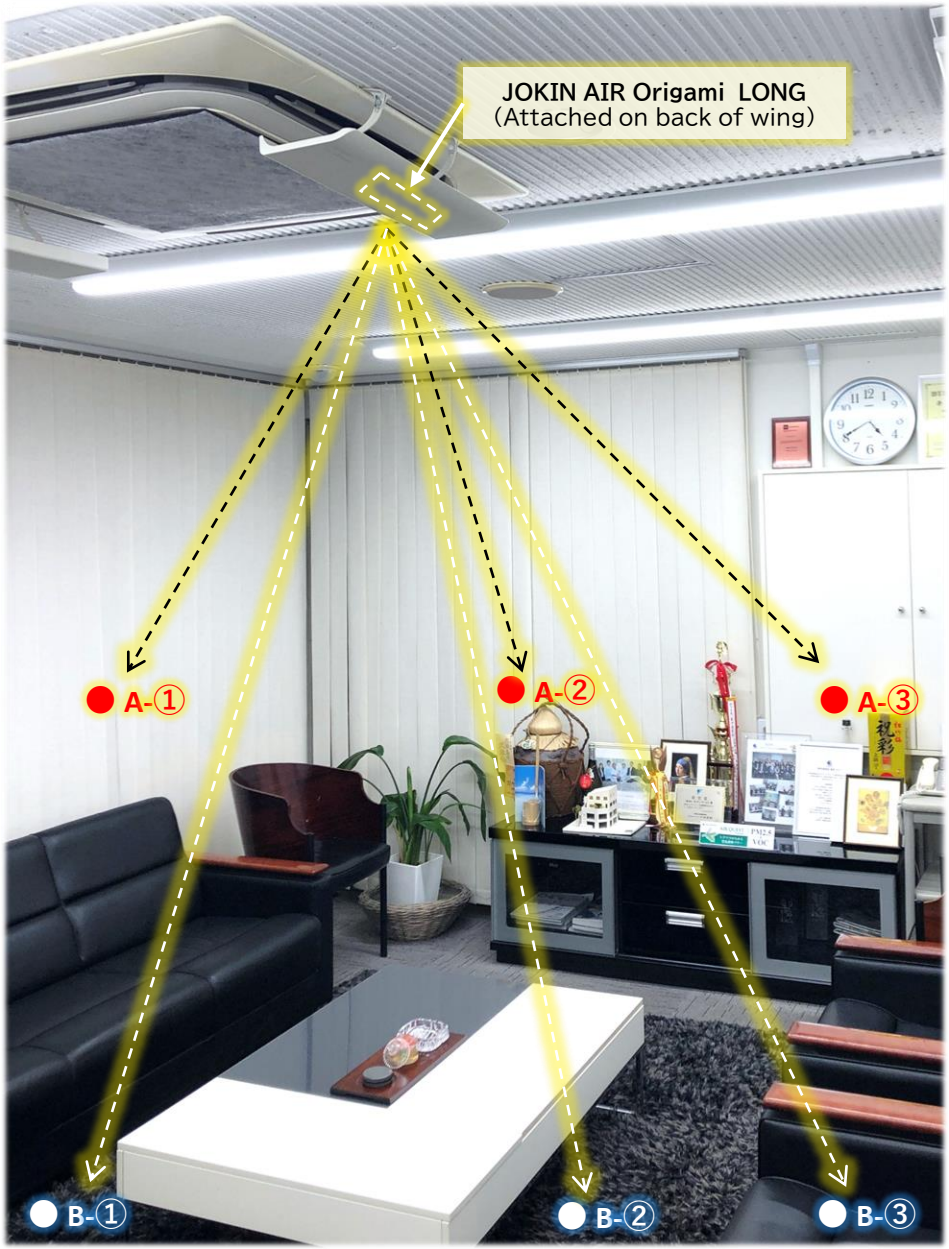
● P.O.C. test ② Concentration in 30㎥ room. ： 0.01ppm - 0.02ppm



● Ordinary size room (30㎥) could be managed by a pack of Origami LONG installed on a wing of ceiling A/C.

JOKIN AIR
ORIGAMI
LONG/MINI
Suggested concentration
0.01-0.02ppm

ClO2 concentration (ppm)	Distance from A/C Under the A/C	Distance from A/C Diagonal:1m	Distance from A/C Diagonal:2m
A : Height from floor :1m	A-① 0.010	A-② 0.013	A-③ 0.015
B Floor surface	B-① 0.011	B-② 0.016	B-③ 0.019

● We could detect safe & effective concentration of ClO2 gas in every spots in the room.

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References

● Safety guidelines to the ClO2 density：

U.S.

① OSHA：Occupational Safety and Health Administration

Method Number	:	ID-202
Matrix	:	Air
OSHA Permissible Exposure Limits	:	**0.1 ppm Time Weighted Average (TWA)**
Final Rule Limits	:	**0.3 ppm Short-Term Exposure Limit (STEL)**
Transitional Limit	:	**0.1 ppm TWA**

② EPA : Environmental Protection Agency

↳EPA publicly announced in addressing the COVID-19 pandemic, that EPA has posted a list of many disinfectants that meet its criteria for use in **environmental measures against the causative coronavirus.**

Japan

③ Industrial Safety and Health Act （Chapter57-Np.9）

↳「ClO2 is to being designated as one of the ”dangerous goods and harmful substances for which the name, etc. should be notified”, however, **there is no standard for exposure limits.**」

● References：

Independent laboratory test

for elimination of viruses in presence of Chlorine dioxide gases molecules

1. Purpose

To verify by scientific test, what extent of Chlorine dioxide emitted in order to eliminate virus in 25m3 space

2. Test Lab

Kitasato Research Center for Environmental Science

3. Laboratory investigation conditions

A)Control: first laboratory Analysis carried without emitting Chlorine dioxide gas and novelty of viruses were investigated.

B) In the presence of Chlorine dioxide gas: In the presence of 0.01ppm – 0.02ppm chlorine dioxide by JOKIN AIR Origami Long/Mini, Novelty of Virus were investigated.

4. Microorganism used during laboratory investigation

Virus：Escherichia coli phage MS2 NBRC 102619
Host bacteria：Escherichia coli NBRC 106373

5. Laboratory Analysis method

-In an empty chamber Chlorine dioxide gas emitter JOKIN AIR Origami placed. Upon certain volume of ClO2 gas molecules monitored, certain number of viruses were spread. In the presence of ClO2 Novelty of viruses had been recorded following chart

Table I.

Relative ClO2 Gas concentration with time interval

(unit: PPM)

Investigation conditon	Time interval in Minutes	
	0	30
② ClO2 Gas concentration	0.013	0.015

Table II.

virus novelty record

(unit: PFU/10 L-air)

Investigation Condition	Time segment				
	0	30	60	90	120
① Without ClO2 Gas	63,000	38,000	21,000	16,000	18,000
② In the presense of ClO2	97,000	470			

＊Examee product：ClO2 Impregnated JOKIN AIR Origami MINI/LONG

＊Type of Virus：Escherichia coli phage MS2 NBRC 102619

＊Investigated Space：25㎥ Chamber

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● SDS for according to Regulation (EC)　(excerpt)

1. Chemical Product and Company Identification

Chemical name　　:　**JOKIN AIR Origami MINI/LONG**
Producer　　:　**Daian Service Inc**
Daian Bldg., 5-23-3, Nishigotanda, Shinagawa-ku, Tokyo, 141-0031, JAPAN
TEL : +81-(0)3-5496-4811　FAX: +81-(0)3-5496-1797

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture
: Explosives Not classified
Flammable gases (including chemically unstable gases) Not classified
Oxidizing gases Not classified
Flammable solids Not classified
Pyrophoric solids Not classified
Self-heating substances and mixtures Not classified
Substances and mixtures which, in contact with water, emit flammable gases Not classified

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS Number	Concentration	EC Number REACH Registration No.
Natural Zeolite	1318-02-1	92%	215-283-8
Sodium Chlorite	7758-19-2	5%	231-836-6
Water	1310-73-2	3%	231-791-2

14. TRANSPORT INFORMATION

IMDG　:　Not dangerous goods
IATA　:　Not dangerous goods
ADR　:　Not dangerous goods
ADN　:　Not dangerous goods

15. REGULATORY INFORMATION

Safety, health and environmental regulations/ legislation specific for the substance or mixture
:　No main regulation

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