

マリンネット株式会社

舶用食品鮮度保持装置 DENBA+Marineご紹介



DENBA+
Pioneering innovation for the world

SUSTAINABLE DEVELOPMENT **GOALS**



会社概要

設立 : 2000年2月25日

資本金 : 200百万円

社長 : 田中克希

主要株主 :

 伊藤忠商事グループ
 商船三井
 川崎汽船
 日本海事協会
 三井物産
 主友商事
ワールドマリン
アンカーシップ
現代商事
富士通 計21社

 日本海事新聞社
 日本郵船
 飯野海運
 三菱商事
 丸紅
 双日
正栄汽船
山水海運
富士貿易



企業理念 :

海運・造船の未来を繋ぐ

マリンネットは海運・造船業界内での中立的な立場に立脚し、人・情報・技術の繋がり
で海運・造船業界の未来を創ることに貢献して行きます。

<行動指針>

- ・海運・造船業界において、中立的な立場であることを自覚すること
- ・情報を集め、活用できる価値ある情報を発信すること
- ・Data技術とDigital技術を駆使し、人・情報・技術を繋いでいくこと
- ・海運・造船業界の未来を創造すること

DENBA技術とは

- ✓ DENBA技術は、水を共振させ水分子の運動を活発にすることで、食物の細胞を活性化するものです。
- ✓ 食材の細胞活性化によって水の腐敗を抑え、菌の発生を抑制し、食品の鮮度を長く保つことが可能。
- ✓ 本船の食材保管室に本体と放電シートを設置(後付け設置も容易)、金属で囲まれていなければ、有効空間内にある食材全てに作用します。箱詰めそのまま有効、特別なオペレーションは不要。

1. 電源をONにするだけ。メンテナンスフリーで簡単

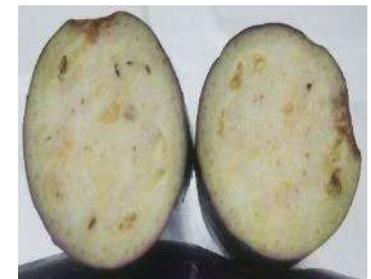
2. コンパクトで場所を取らない

3. 安全設計・電気用品安全規格PSE認証取得

DENBA+
Pioneering innovation for the world



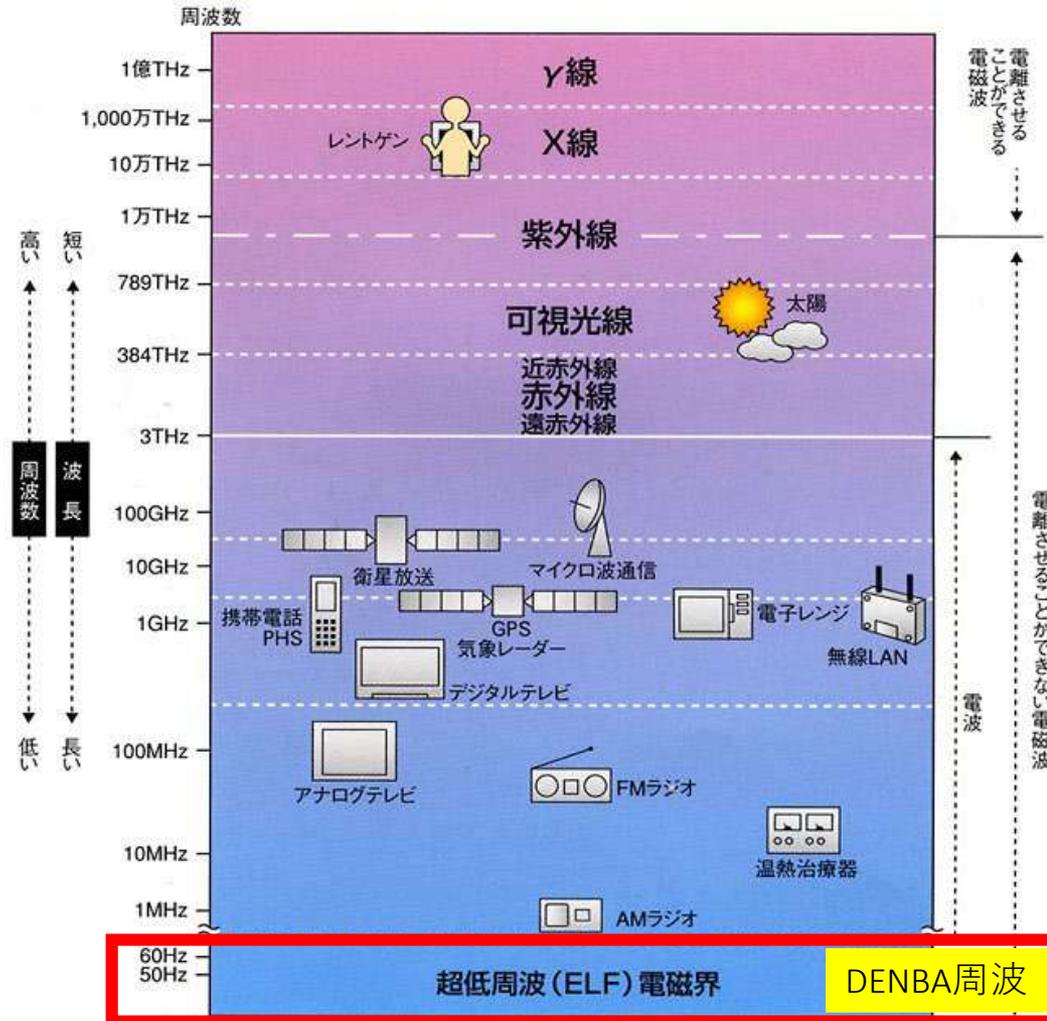
35th day / without DENBA



35th day / with DENBA

DENBA技術とは

●周波数による電磁波の分類



超低周波電磁界とは

商用周波数（50/60Hz）の電磁波は超低周波（ELF：Extremely Low Frequency）電磁界とも呼ばれています。

超低周波（ELF）電磁界の波長は6,000km/5,000kmと地球の半径ほどの長さなので、例えば送電線の近くでも電波などとは異なり波の性質が非常に小さくなります。このため超低周波（ELF）電磁界の電界、磁界の領域については、電波とは別の安全基準が制定されています。

出典：一般社団法人電波産業会・電磁環境委員会「くらしの中の電波」サイト

1T(テラ) = 10¹² 1G(ギガ) = 10⁹ 1M(メガ) = 10⁶

DENBA+Marine 製品仕様

入力電圧:AC100V-120V
AC220V-240V
(50Hz/60Hz)

消費電力: 4W

※DENBA+Marineには、200Vモデルと100Vモデルがあります。
本船の電圧がどちらかご確認ください。



本体ユニット

放電マット



X 3枚

DENBA+Marine 製品仕様(防水レセクタブル (電源プラグ) 付属)

DENBA+Marine



Model	DENBA Marine (100V Ver.)
Dimensions	W100mm×D100mm×H106mm
Input Voltage	AC100V 50/60Hz
Power Consumption	4W
Weight	4.6kg



Model	DENBA Marine (220V Ver.)
Dimensions	W100mm×D100mm×H106mm
Input Voltage	AC220V 50Hz
Power Consumption	4W
Weight	4.6kg



Discharge Mat	DP-WP10
Dimensions	W1200mm×D660mm×H10mm
Weight	1.35kg
Quantity of pieces per unit	3pcs



Model	Waterproof plug PI2-2B(Yellow)
Input Voltage	AC100V-130V
Performance	IP56
Weight	0.18kg



Model	Waterproof plug PI2-2B(Blue)
Input Voltage	AC200V-250V
Performance	IP56
Weight	0.18kg



Model	Waterproof plug 1B-1P
Performance	IP56
Weight	0.12kg



放電状況を音で確認出来るVoltage Testerを納入時にお付けします。

背景(SDGs/コロナ禍の影響)

船員を、より健康的に



働きがいも、成長も。



食物ロスの低減



船舶・海事業界においてもSDGsの流れやコロナ禍の影響で、船員の質・モチベーション維持の為労働・食環境の改善を図る潮流があり、各国海上保安庁による検査でも、住環境・食環境のチェックが細くなくなる傾向が強まっている。

SUSTAINABLE DEVELOPMENT GOALS

背景(法令順守の強化/労働環境の改善)

MARITIME LABOUR CONVENTION, 2006(2006年海事安全労働条約)和訳より

第3.2規則 食料及び料理の提供

目的:船員が規律された衛生的な条件の下で提供される良質の食料及び飲料水を利用することができることを確保すること

1 加盟国は、自国を旗国とする船舶が当該船舶の需要を適切に満たし、かつ、異なる文化的及び宗教的な背景を考慮した**適当な品質、栄養価及び量の食料及び飲料水を船舶内に備え、及び提供すること**を確保する。

B 指針検査、教育、調査及び公表

第3.2.1

1 権限のある機関は、他の関連する機関及び団体と協力して、船舶において料理を提供することに伴う要請を特に考慮して、栄養並びに食料の購入、貯蔵、保存、調理及び配膳の方法について最新の情報を収集すべきである。



検査の強化!



Australian Government

Australian Maritime Safety Authority

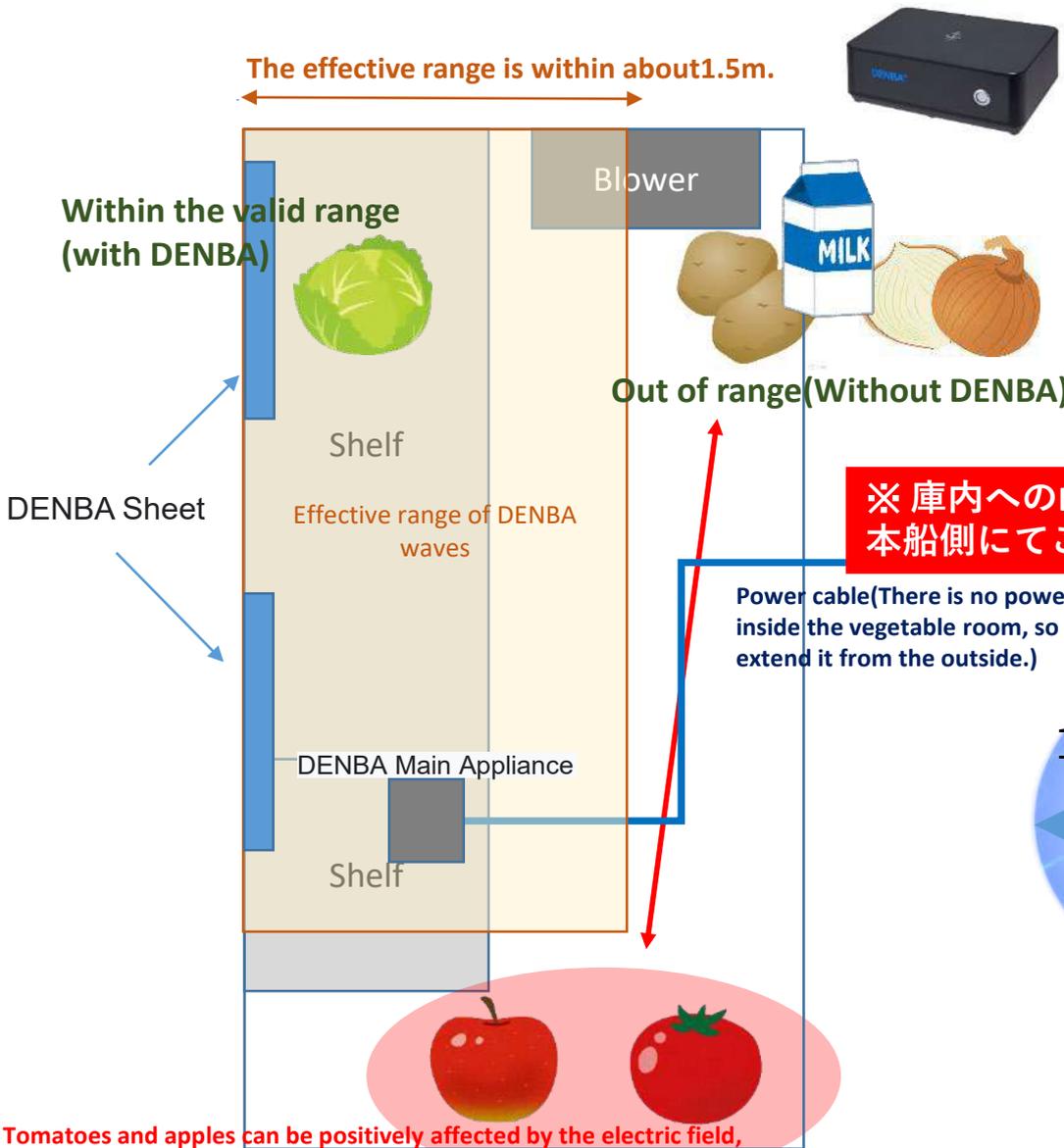
日本海事協会(NK)資料

https://www.classnk.or.jp/hp/pdf/publications/Publications_image/PSC19J.pdf

https://www.classnk.or.jp/hp/pdf/publications/Publications_image/PSC20J.pdf

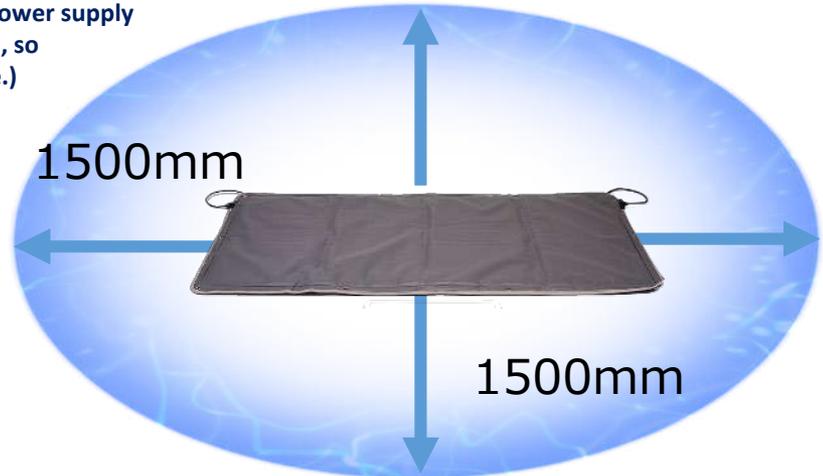
2020年は全世界でLabour Conditions -Accommodation,recreational facilities,food and cateringによる拘留事例は13件。豪州ではLabour conditions -minimum requirements for Seafarersで4件拘留されているが、FOODに関するものは、明示的に2件、食料、飲料が不十分として拘留されており、カナダのよう。

野菜庫へのDENBA+Marine設置施工例



※ 庫内へのDENBA用電源ソケット増設は本船側にてご用意頂く必要が御座います。

Power cable (There is no power supply inside the vegetable room, so extend it from the outside.)



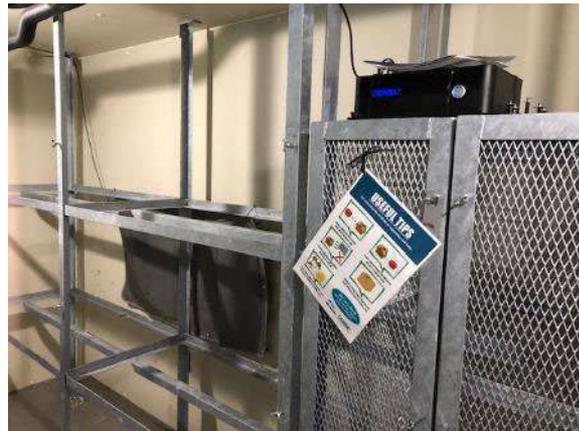
放電マットのエッジより半径1.5mの空間が有効範囲

Tomatoes and apples can be positively affected by the electric field, but the ethylene gas they produce affects other vegetables, so keep a distance from other vegetables.

野菜庫へのDENBA+Marine設置施工例

15名前後の船員が1か月程度船内で生活するに十分な量の食糧はおおむね確保される。内容としては、穀物類が3割、比較的長期保存可能な夕社`等の野菜が2割、葉物野菜が2割、牛乳、卵が2割、フルーツジュース(砂糖タップリで甘そうな!)ヨーグルト等が1割といったバランスで納入されている事が多い。Crewの出身国構成によって、中国・ベトナム・インドネシア船員なら野菜はこれよりも多めで、フィリピン人船員なら葉物野菜は他国に比して少な目。

庫内への電源ソケット増設は本船側にてご用意頂く必要が御座います。



野菜庫へのDENBA+Marine導入までの流れ

① 導入する船の電圧を確認 (100V/200V其々にご用意があります)



② **本船側で、本船食糧庫内への電線引込・コンセント設置**



③ 本船の動静にあわせ、DENBA機器を指定船具店宛郵送



④ 機器積込後、DENBA本体とシートを庫内壁面へ取付、配線。



⑤ 検電器で、DENBAのActiveなエリアを確認

⑥ DENBA Active エリア内に鮮度保持対象の野菜を置く。



DENBA技術(野菜の比較結果例)

【DENBA有無環境での食品保持状態比較】

without DENBA

35th day

with DENBA



ナス



DENBA技術(野菜の比較結果例)

【DENBA有無環境での食品保持状態比較】

without DENBA

35th day

with DENBA



DENBA技術(野菜の比較結果例)

【DENBA有無環境での食品保持状態比較】

without DENBA

19th day

with DENBA



ほうれん草



コック/船員による モニタリングレポート(写し)

本船に於いて、DENBA環境有無での野菜鮮度比較を行ったCrewレポート。

Appearance Comparison sheet <A>

Procurement date
Comparison date
Set temperature: +5
Filer: Chief cook/Messman
Time

Check item
vegetable name: CAULIFLOWER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: GREEN PEPPER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: CUCUMBER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: CHINESE CABBAGE

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: BUTTER MELON

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ALL VEGETABLE IN PHOTO ARE BETTER IN PLACE THAT HAVE RANGE OF DENBA ACTIVE, COMPARE TO THE OTHER VEGETABLE THAT CANNOT REACH THE RANGE OF DENBA ACTIVE.

Appearance Comparison sheet <A>

Procurement date
Comparison date
Set temperature: 15
Filer: Chief cook/Messman
Time

Check item
vegetable name: CAULIFLOWER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: GREEN PEPPER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: CUCUMBER

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: CHINESE CABBAGE

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name: BUTTER MELON

	"On DENBA" is better	"Non DENBA" is better if I have to choose	No difference	"Non DENBA" is better if I have to choose	"Non DENBA" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DAY 24 OF JULY

NOW ALL VEGETABLE IN DENBA ACTIVE STARTING TO HAVE A BLACK SPOT AND THE LEAFY VEGETABLE IS STARTING TO TURN IN COLOR BROWN. AND THE NON DENBA ACTIVE VEGETABLE IS IN NO GOOD CONDITION COMPARE TO THE LAST PHOTO.

DENBA導入後の本船献立推移(写し)

Daily Menu (抜粋)

		MENU			
14-Aug-21	Breakfast	Pork Luncheon meat	Fried egg		
	Lunch	Red snapper fish sinigang	Vegetables salad	Fresh banana	
	Dinner	Pork Adobo	Sauteed vegetables		
22-Aug-21	Breakfast	Pork Luncheon meat in tin	Fried egg	Yogurt	
	Lunch	Tuna head whole tinola	Sauteed mix vegetables pinakbet	Ice cream	
	Dinner	Pork tenderloin steak	Vegetables salad	Sparagus soup	
27-Aug-21	Breakfast	Pork Luncheon Meat	Fried Dried Squid		
	Lunch	Pork Feet Sinigang	Fried fish sardines	Vegetables salad	Water Melon fresh
	Dinner	Sauteed Chicken with coco milk	Milk fish Paksiw		
01-Sep-21	Breakfast	Chicken sausage	Fried Dried Squid	Orange Juice	
	Lunch	Pork Feet Sinigang	Fried milk fish	Vegetables salad/ Atsara	Apple Fresh
	Dinner	Pork hocks Pata	Sopas/ Soup		
05-Sep-21	Breakfast	Chicken sausage	Scrubled Egg	Fresh Milk	
	Lunch	Prawn Sinigang	Pork Minced Burger steak	Fruit salad	
	Dinner	Fish Mackerel Paksiw	Mix vegetables with coco milk		
09-Sep-21	Breakfast	Chicken sausage	Scrubled Egg	Fresh Milk	
	Lunch	Tuna head whole tinola	Mix vegetables		
	Dinner	Chicken Adobo	Fried Fish		

Daily Menu記録

本船報告

Our frank feedback is that it really change/benefited and have a lot of advantage applying DENBA, the healthy lifestyle of whole crew onboard consuming fresh vegetables and fruits daily, due to all vegetables and fruits stay fresh until to the last supply. Aside from healthy foods, we can save provision consumption if every time we have a fresh vegetables to eat mixed with fish or meat rather than consuming whole meat daily as it was expensive compare to vegetables.

この船の事例では、8/14に出航した後、4週間弱あとの9/09になっても、生野菜を使った献立で食事が供されました。

野菜モニタリング経過(Crewコメントまとめ)

18days later



All vegetable in photo are better in place that have range of DENBA active, compare to the other vegetable that cannot reach the range of DENBA active.

23days later



Now, all vegetable in DENBA active starting to have a black spot and the leafy vegetable is starting to turn in color brown. The non DENBA active vegetable is in no good condition compare to the last few days.

26days later



All Vegetable in DENBA active and non DENBA active range are all in no good apprerance.
But in my ovservation the vegetable that in place in DENBA active is longer life compare to non DENBA active range vegetable.

導入船舶Crewの声

みずみずしい
シャキツとしている

... installed onboard our vegetable room, it's **amazing** how technology successfully preserved the **freshness** and ... and fruits .

The vegetable purchased at Naoshima, Japan in which it was the same date the DENBA+ was installed onboard, has **retained more than 95% of their freshness** or...

**AMSAの心証
すこぶる良し!**

歯ごたえがあり、
新鮮さを感じる

DENBA's performance installed on board this vessel is **truly effective** and very much working good for **better and longer freshness** of fruits and vegetables life. It was daily monitoring by myself and crew are happy about the result of this component. Thanks for such good inventions made by DENBA.

DENBA+Marineの優位性、まとめ

- ①取付簡単！就航船へのレトロフィットや別船への移設もCrewで簡単に実施可能！
- ②電源ボタンをONにするだけ！そのほかの操作は一切なし！
(Blackout後は電源の入れ直しが必要です)
- ③非接触で効果が得られるので、野菜を箱から出す必要なし！
(金属製の箱から出す必要はあります)
- ④安心の防水性能で、清掃時に水が掛かっても問題なし！
- ⑤オゾン発生装置やエチレンガス吸着装置等との併用可能！
- ⑥人体への悪影響なし、むしろ好影響！

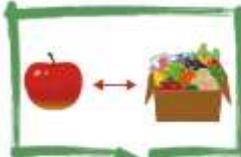


DENBAフォローアップ

DENBAを使用した更なる食品の鮮度保持 = 長期利用を実現するべく、野菜の保管方法や注意事項等をフォローアップいたします。

USEFUL TIPS

for extending the shelf life of vegetables and fruits



Keep a distance from food that emit ethylene gas.



If you cannot keep the distance, put it in a sealed case.



Avoid exposing vegetables directly to cold air.



Better to keep foods that do not emit ethylene gas in boxes, too.



We care about rich & varied dietary Life for CREW.



Marine.net DENBA+
Division of the DENBA Group for the world

Rice, onions, garlic and potatoes may be stored outside the DENBA area.

Ethylene Gas Producing Foods

Correctly store fruits and vegetables to reduce food waste.

What is ethylene gas?
Ethylene is a gas naturally released by some fruits and vegetables resulting from the ripening.

Why should I care?
Fruits and vegetables that are stored incorrectly spoil quickly. This could mean lost profit for you.

What can I do?

- Do not store fruits and vegetables that produce ethylene with those that are sensitive to ethylene. For example, do not store bananas and apples next to each other. This applies to produce that is refrigerated and not refrigerated.
- Do not store produce in bags or sealed containers. This will trap the gas and cause the produce to ripen faster.

Ethylene Producers

Apples Avocados Bananas Cantaloupe Kiwi Peaches Pears Peppers Tomatoes

Ethylene Sensitive

Apples Asparagus Avocados Bananas Broccoli Cantaloupe Collard Greens Cucumber Eggplant Grapes Honeydew Kiwi Lemons Lettuce Limes Mangos Onions Peaches Pears Peppers Squash Sweet Potatoes Watermelon

Not Ethylene Sensitive

Blueberries Cherries Beans (Snap) Garlic Grapefruit Oranges Pineapple Potatoes Raspberries Strawberries Tomatoes Yucca



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Document No: 22VT00850

THIS IS TO CERTIFY that the undernoted product has been examined and found in order in accordance with manufacturer's specification.

This certificate is issued to
Applicant : DENBA JAPAN CO., LTD.
Place of applicant : Tokyo, Japan

Product descriptions:
1) Food freshness preservation device

Product name : DENBA+ Marine

Version No. : Version 2

This certificate is subject to the conditions specified in the attached sheet(s).
Issued at Tokyo on 9th March 2022.


(Hisashi Ikeda)
General Manager
Technical Solution Department



Attached sheet to certificate "22VT00850" (1/2)

1. Definition of "Product Description(s)"

- 1) This freshness preservation device generates a low frequency (30-60hz) electric potential (voltage) in a certain range of space from discharging mat, which gives fine vibrations and resonance to the water molecules in the food.
By installing the freshness preservation device in a storage (refrigerated warehouse) in the ship, it resonates, activates water molecules in the food, which leads to food freshness preservation.

This freshness preserving equipment will contribute to reducing food loss, maintaining the health of seafarers, and improving the food environment, which in turn will help to ensure a better quality of seafarers and will be a positive contribution to the SDGs.

This technology has obtained patent in 46 countries/region including following.

Patent No.
JP 5683032 B1, 5974377 B2, 6366882 B1
CN 105472998 B, 10741519 B
KR 10-1739099 B1, 10-2069813 B1

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