

# FRESER

SPECIALIZED MANUFACTURER OF FOOD FREEZING MACHINERIES

## 製 冰 廠

PRELIMINARY PROJECT PROPOSAL FOR  
**ICE MAKING PLANT**



先日光冷凍工業股份有限公司  
FRESER INTERNATIONAL CORPORATION

# FRESER 製冰廠

## Ice Making Plant

### 前言

長久以來，塊冰的需求量並未因為時代的進步而減少，相反的，其使用量卻是與日俱增。隨著冷凍科技的研發改善，製冰廠設備也益發先進且效率提昇。

塊冰的應用相當廣泛，例如：建築業、化工業對塊冰就有很大的需求量，但是因而自建一個製冰廠卻不足經濟規模；水產漁獲業亦是塊冰的主要使用者，從水產品捕獲到販賣給消費者，這段期間的保鮮工作非常重要，冰塊則是必備又便利的保鮮用品；販售食物飲料的零售業、餐飲業，也需要大量的冰塊來保持冷藏食品的鮮度及飲料的冰冷度。

塊冰是最常用的一種冰塊形式，其原因如下：塊冰遠比其他形狀種類的冰較慢溶化，將塊冰放置在開放式的卡車上，僅覆蓋以帆布隔熱，可以運送達四小時的車程距離。

塊冰的外形為六個平面，可堆疊達十五公尺高，易於大量儲藏；又，塊冰有易於搬運和可分割成多塊的優點。相對的其他型式的冰則因容易黏結成塊，而變得難以使用。

本計劃書所列的製冰廠規範，乃本公司長年研究發展的經驗與成果，且係針對熱帶地區氣候型態所設計，最有效率的冷凍系統及生產模式。因而，在各種不同的氣候季節下，都能給製冰廠投資者創造最佳利潤。

### Introduction

The demand for block ice is as great today as it ever has been, despite advances made in the development of modern refrigeration equipment.

The chemical and construction industries, for example, commonly use block ice in situations where the use of such equipment may not be practical. The fishing industry is also another major consumer of block ice, which is used to preserve the fish from the time they are caught, until they are sold. It is also used to great extents by the retailers of food and drinks to preserve food and/or chill drinks.

Block ice is the most popular type of ice sold for a variety of reasons. It melts more slowly than other types of ice and thus lasts longer. It can be placed in open truck with only a tarpaulin to protect it from the elements and shipped to a location of four hours away.

Its rectangular shape makes it easy to stack of up to 15 meters and store large amounts. Block ice has merits of easy to transport and separate as well. Other types of ice have the tendency to freeze into a solid mass, making it difficult to work with.

The ice making plant outlined in this proposal is the result of years of research and development done by FRESER. The plant was designed to operate efficiently in tropical areas, but should prove to be profitable in any climate.

# 製冰廠概述 Plant Description

## 設廠地點

製冰廠選擇設廠地點最重要的考慮因素應該是要接近對於塊冰有相當需求量的地方，例如漁港附近。

## Plant Site Planning

The most important factor to be considered when selecting a location for an ice making plant is its proximity to a place demanding for block ice, such as fishing port.

## 生產能力

為便於業主選擇所需的冰廠規模，本提案書規劃了每日產能從10噸到100噸的製冰廠供參考。我們亦可為特殊需求做規劃設計，以符合個別的需求。

## Production Capacity

Standard plants are available in a variety of sizes with production capacities ranging from 10~100 tons per day. Other scale of plants can also be designed if so desired.

## 原料

清水是製冰廠所需要的唯一原料。水源供應能力須充足。如果冰塊是以食用為目的，請務必使用可供飲用的過濾水為原料水。

## Raw Material

The only raw material used in ice plant is clean water with sufficient supply. If the ice is intended for human consumption, the water should be potable.

## 人力需求

製冰廠每班工作人數：操作員2人，內勤職員1人，機械保養員1人，共計4人，即可運轉。

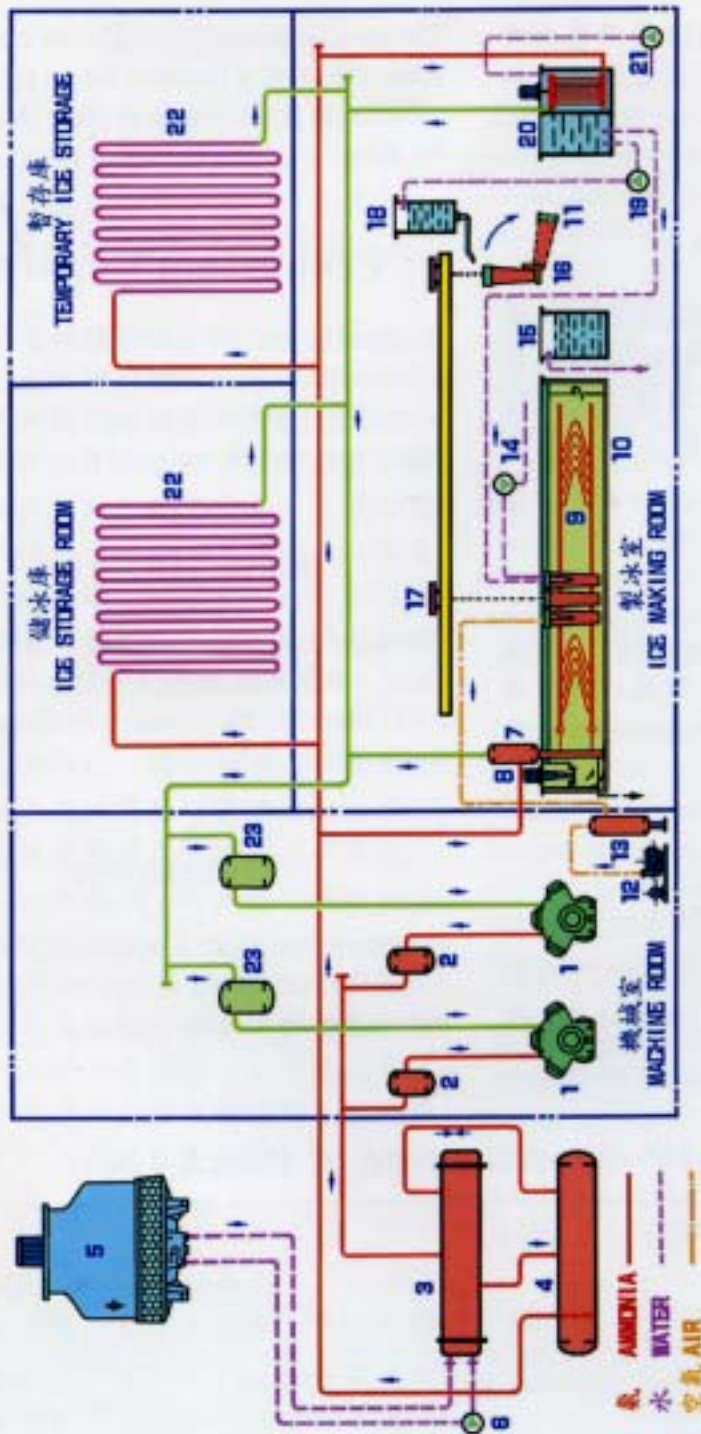
## Manpower

Personnel Per Shift: 2 operators, 1 staff and 1 maintenance, total 4 persons that will be able to run an ice plant.

## 塊冰規格 Specification of Block Ice

冰塊重量 Weight per Block		冰桶外型尺寸 Ice Can Dimension	凍結時間 Freezing Time
55 Lbs.	25 Kgs.	240 mm × 159 mm × 914 mm H	16 Hrs
110 Lbs.	50 Kgs.	406 mm × 203 mm × 800 mm H	26 Hrs
150 Lbs.	68 Kgs.	380 mm × 200 mm × 1170 mm H	25 Hrs
300 Lbs.	135 Kgs.	560 mm × 280 mm × 1200 mm H	49 Hrs

# 系統流程圖 System Flow Chart



- |         |                    |         |                  |          |                  |
|---------|--------------------|---------|------------------|----------|------------------|
| 1. 壓縮機  | Compressor         | 09. 蒸發器 | Brine evaporator | 17. 天車   | Hoist crane      |
| 2. 油分离器 | Oil separator      | 10. 製冰槽 | Ice making tank  | 18. 注水槽  | Can filling tank |
| 3. 冷凝器  | Condenser          | 11. 冰桶  | Ice can          | 19. 注水泵  | Filling pump     |
| 4. 受液器  | Receiver           | 12. 鼓風機 | Air blower       | 20. 預冷槽  | Pre-cooling tank |
| 5. 冷卻水塔 | Cooling tower      | 13. 集氣筒 | Air receiver     | 21. 原料水泵 | Raw water pump   |
| 6. 冷卻水泵 | Cooling water pump | 14. 沁水泵 | Suck pump        | 22. 冷卻管排 | Cooling coil     |
| 7. 集注器  | Accumulator        | 15. 溶冰槽 | Thawing tank     | 23. 液分離器 | Liquid separator |
| 8. 攪拌器  | Brine agitator     | 16. 倒冰機 | Can dumper       |          |                  |

## 製冰程序

將冰桶置於柵架框格內，用天車把柵架移到注水器下方，注水器會加注預冷過的冰水入冰桶內，到適當的水位即自動停止。如果製成的冰塊以食用為目的，請務必加注可飲用的過濾清水。

冰桶加滿水後，再用天車吊到製冰槽內適當的位置，然後下降至槽內。製冰槽內放滿了低溫的氯化鈣液體，藉著循環水泵持續地循環流動，使整個槽內溫度保持在 $-10^{\circ}\text{C}$ 。

為了清除水內的雜質和氣泡，用吹氣管把空氣導入冰桶中以產生一個漩渦，將雜質集中在冰桶中央位置。等到結冰將完成的階段，插入沁水泵的接管，把含有雜質的冰水吸出，再重新加入預冷過的冰水。

冰塊完成凍結所需的時間，依照冰桶的厚度大小而定，150磅的冰塊約24小時，300磅則需48小時，方可凍結完成。

冰塊完全凍結後，用天車將柵架從槽中取出，移放入溶冰槽內，用溶冰槽的常溫水對冰桶稍微加溫化冰，讓冰桶內的塊冰得以滑出。接著將柵架移到倒冰臺上，將冰塊倒出，推入貯冰庫存放。

將空冰桶移到注水槽下重新加水，進行下一回的製冰。製成的冰塊可拖進儲冰庫內，利用疊冰機往上堆疊存放。必要時，可立即送出給客戶使用。

## Process Description

Ice cans are placed in can grids and moved to beneath the filling tank which automatically fills each can with proper level of pre-cooled water and then stop. Potable water must be used to make ice intended for human consumption.

The cans are then hoisted and carried to the brine tank and immersed inside. The brine, which is a calcium chloride solution kept at a temperature of  $-10^{\circ}\text{C}$ , is constantly circulated by agitator in order to keep the temperature consistent throughout the tank.

Air is blown into the center of the can to induce a swirling motion. This causes any impurities and air bubbles in the water to be collected in the center of cans. Prior to finish freezing, this core is removed by a suction pump and replaced with fresh pre-cooled water.

The time required for the water to be frozen varies according to the size of cans being used, 150 lbs block requires 24 hours, 300 lbs. takes 48 hours.

When the ice has completely formed, the grids are lifted up from the brine tank and moved to place in the thawing tank. Using the warm water heats the can, until the ice allowed to be slid out. The block ice is then removed from the can by a can dumper.

The empty cans are returned to filling tank for next ice making cycle. The ice is moved to ice storage and stacked by an ice stacker, or it can be delivered to customer right away upon requested.

## 機器設備 Machinery and Equipment

設備規格 Description	Unit	設備規格 Description	Unit
<b>1. 壓縮機組 Compressor Unit</b>			
a. 壓縮機 Compressor	2		
<b>2. 高壓段設備 High Pressure Side Equipment</b>			
a. 冷凝器 Condenser	2	d. 油分離器 Oil separator	1
b. 冷凝水泵 Cond. cooling pump	2	e. 油缸 Oil drum	1
c. 受液器 Receiver	1	f. 冷卻水塔 Cooling tower	2
<b>3. 製冰設備 Ice Making Equipment</b>			
a. 製冰槽 Ice making tank	1	h. 溶冰槽 Thawing tank	1
b. 蒸發器 Brine evaporator	1	i. 注水槽 Filling tank	1
c. 攪拌器 Brine agitator	1	j. 注水泵 Filling pump	1
d. 冰桶 Ice can	320	k. 預冷槽 Pre-cooling tank	1
e. 木板蓋 Wooden lids	320	l. 集注器 Accumulator	1
f. 柵架 Can grids	80	m. 液分離器 Liquid separator	2
g. 倒冰機 Can dumper	1	n. 天車軌道 Hoist crane	1
<b>4. 清水設備 Clear Ice Equipment</b>			
a. 鼓風機 Air blower	1	c. 集氣筒 Air receiver	1
b. 沁水泵 Suck pump	1	d. 吹氣管 Drop tube	320
<b>5. 儲冰設備 Ice Storage Equipment</b>			
a. 壓縮機 Compressor	1	c. 疊冰機 Ice stacker	1
b. 冷卻機組 Cooling unit	1	d. 保溫庫門 Insulated door	1
<b>6. 其他設備 Sundry Equipment</b>			
a. 保溫材料 Insulation materials	1	e. 配管材料 Piping Materials	1
b. 冷媒 Refrigerant	1	f. 控制閥 Control valves	1
c. 氯化鈣 Calcium chloride	1	g. 電器開關 Electric switches	1
d. 冷凍油 Refrigeration oil	1	e. 控制箱 Control panel	1

附註：淨水設備及碎冰機為選擇性配備，可依照客戶的需要而安裝。

Note: Water filter and ice crusher are optional equipments and available upon request.

## 規模及負載 Plant Specification

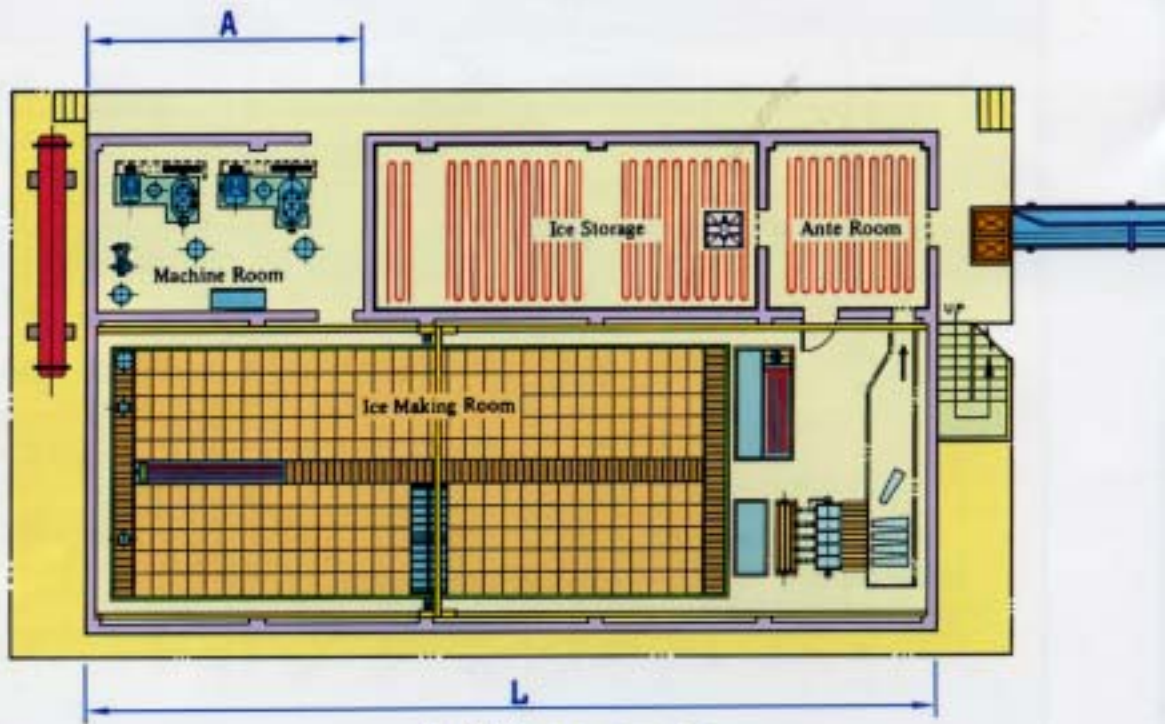
製冰能力 (噸/日) Production (Ton/Day)	10	15	20	25	30	40	50	60	100
儲冰庫容量 (噸) Ice Storage (Ton)	100	150	200	250	300	400	500	600	1000
面積 Floor Space ( M <sup>2</sup> )									
製冰室 Ice making room	100	131	161	194	220	268	318	370	636
儲冰庫 Ice storage	44	65	83	103	124	162	200	220	413
暫存室 Ante room	34	34	32	32	36	40	66	70	132
機械室 Machine room	58	61	72	76	79	106	133	145	184
合計 Total	236	291	348	405	459	576	717	805	1365
冷凍負載 Refrigeration Load ( JRT )      1JRT:3.86KW									
製冰 Ice making	22	34	39	48	55	76	94	114	186
儲冰庫+暫存室 Storage + Ante room	3	4	3	6	6	7	7	8	9
合計 Total	25	38	42	54	61	83	101	122	195
消耗功率 Power Consumption ( Kw )      1KW:1.341HP									
製冰合計 Ice Making, Total	51	74	99	121	144	191	236	280	445
1. 冷凍機 Compressor	37	56	75	93	112	149	187	224	373
2. 冷凝機組 Condenser	2	3	5	6	7	9	10	11	20
3. 附屬設備 Other equipment	12	15	19	22	25	33	39	45	52
儲冰合計 Ice Storage, Total	8	11	11	15	15	20	20	20	29.5
1. 冷凍機 Compressor	6	8	8	11	11	15	15	15	22
2. 其他設備 Other equipment	2	3	3	4	4	5	5	5	*7.5

附註：上列消耗功率係製冰與儲冰分別為獨立冷凍系統。

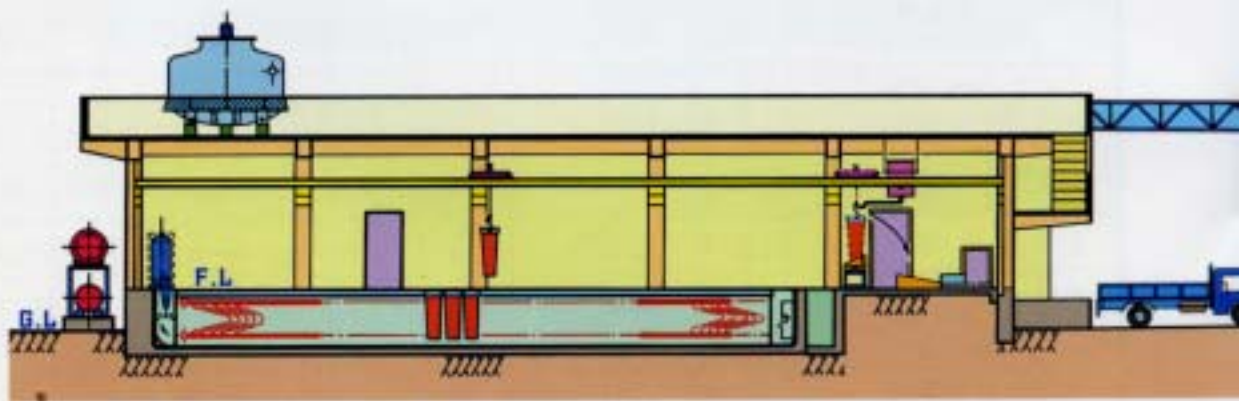
Note : The above power consumption is base on ice making and storage with individual refrigerating system.

# 製冰廠平面圖

## Ice Making Plant Layout

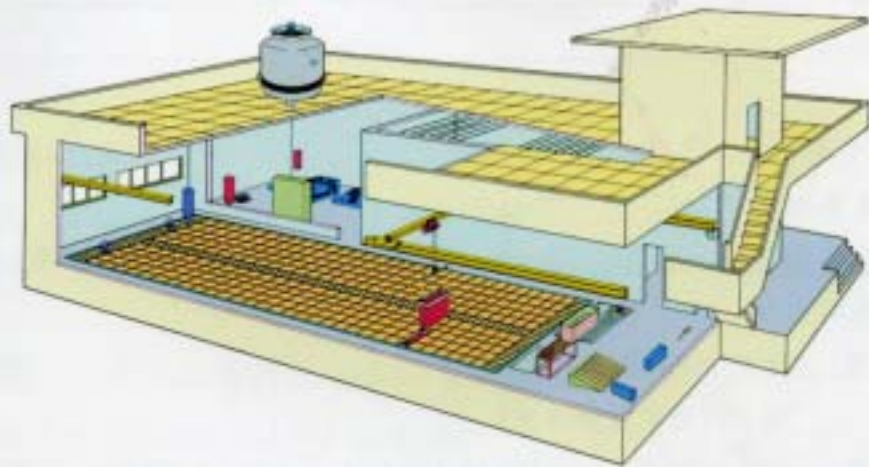


上視圖 TOP VIEW

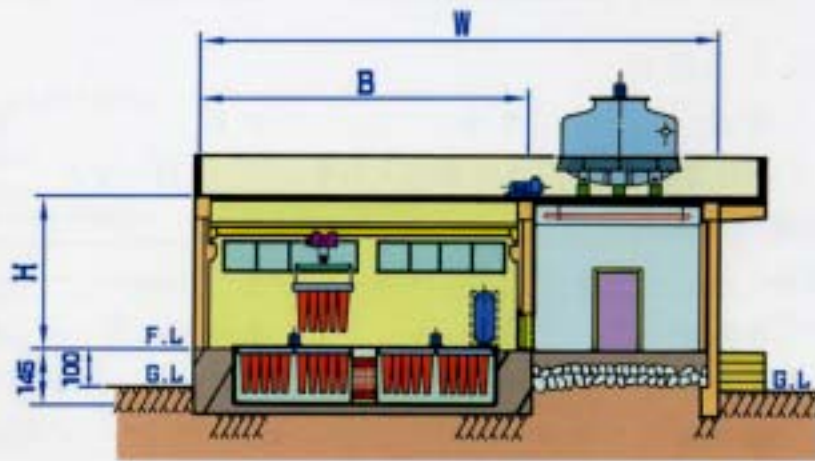


正視圖 FRONT VIEW





立體圖 THREE DIMENSION DIAGRAM



右側視圖 SIDE VIEW

## 【製冰廠需求問卷調查】

請傳真至老日光公司 Fax: (02)2811-4332

### ● 客戶基本資料

公司: \_\_\_\_\_  
地址: \_\_\_\_\_ 廠址: \_\_\_\_\_  
電話: \_\_\_\_\_ 傳真: \_\_\_\_\_  
連絡人: \_\_\_\_\_ e-mail: \_\_\_\_\_

### ● 冰廠能力需求

日產製冰量: \_\_\_\_\_ Tons/24Hrs  
儲冰庫容量: \_\_\_\_\_ Tons (建議容量為容納10天產能的冰量)  
冰塊的需求:  
冰型: 透明冰(須裝設鼓風系統) 白冰 海水冰  
碎冰(須裝設碎冰機)  
重量: 55 Lb (25 Kg) 110 Lb (50 Kg) 150 Lb (68 Kg) 300 Lb (135 Kg)  
其他規格: 重量 \_\_\_\_\_, 尺寸長 \_\_\_\_\_ x 寬 \_\_\_\_\_ x 高 \_\_\_\_\_ cm  
用途: 食用 食品冷藏 漁船使用  
化工冷卻 混凝土攪拌 其他: \_\_\_\_\_  
冷媒: 氟氯烴 Freon 氨 Ammonia 將由業主自行採購

### ● 設廠工地現況

位置: 海邊 河邊 市區 郊區  
廠房: 將新建廠房 既有廠房, 高度: \_\_\_\_\_ M, 型式 \_\_\_\_\_  
土地面積: 總面積 \_\_\_\_\_ m<sup>2</sup>, 廠房面積 \_\_\_\_\_ m<sup>2</sup>  
電源規格: \_\_\_\_\_ & \_\_\_\_\_ Volt, \_\_\_\_\_ Hertz, \_\_\_\_\_ Phase  
水源: 自來水 河水 泉水 海水  
水質: 飲用水 不可飲用 須裝設淨水系統  
水量: 每日供應量 \_\_\_\_\_ 公升  
夏日平均最高氣溫: \_\_\_\_\_ °C  
進水平均最高溫度: \_\_\_\_\_ °C

## 【 Inquiry Questionnaire 】

Please facsimile to us at Fax No. + 886-2- 2553-2742

### • Customer Information

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Contact: \_\_\_\_\_ e-mail: \_\_\_\_\_

### • Plant Requirement

Production Capacity: \_\_\_\_\_ Tons/24Hrs

Ice Storage Capacity: \_\_\_\_\_ Tons (10 days production amount is recommended)

Required Ice Block:

Type:  White Ice       Flake Ice (Ice Crusher is required)

Sea Water Ice       Clear Ice (with air system)

Weight:  55 Lb (25 Kg)     110 Lb (50 Kg)     150 Lb (68 Kg)     300 Lb (135 Kg)

Others: Weight \_\_\_\_\_ , Ice Size \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_ cm

Usage Of Ice:  Eating     Concrete Mixing     Supplying Fish Boat

Chemical Industry       Preserving Food     Others \_\_\_\_\_

Refrigerant:  Freon     Ammonia     To be provided by plant owner

### • Plant Site Conditions

\*Location:  Sea Side     River Side     City     Suburb

Building:  To be constructed     Existing, Height : \_\_\_\_\_ M , Type : \_\_\_\_\_

Land Area: Total \_\_\_\_\_ m<sup>2</sup> ; Building \_\_\_\_\_ m<sup>2</sup>

Electric Power : \_\_\_\_\_ & \_\_\_\_\_ Volt , \_\_\_\_\_ Hertz , \_\_\_\_\_ Phase

Water Source:  River     City Water     Well     Sea

Water Quality:  Portable     Non-portable     Filtering system is required

Water Volume Available: \_\_\_\_\_ liter per day

Average Highest Summer Temperature: \_\_\_\_\_ °C

Highest Temperature Of Incoming Water: \_\_\_\_\_ °C

## 冷凍製冰 · 空調電氣 · 整廠輸出

\*\*\*\*\*

- COLD STORAGE PLANT
- 冷凍庫冷藏庫
- BLOCK ICE MAKING PLANT
- 大型製冰工廠
- IND. FLAKE ICE MAKER
- 產業用碎冰機
- CONVEYOR IQF FREEZER
- 輸送板式IQF
- CONTACT FREEZER
- 接觸式凍結機
- AIR BLAST FREEZER
- 冷風急速凍結
- FROZEN FOOD PROCESS
- 食品冷凍加工
- VESSEL REFRIGERATING
- 漁船冷凍設備
- PLANT AIR-CONDITIONING
- 廠房空調電氣
- SYSTEM IMPROVEMENT
- 冷凍系統改善

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## 專業規劃 · 設計製造 · 統包服務

<p>可行性分析 STUDY FEASIBILITY</p> 	<p>建廠計劃 PROJECT PLANNING</p> 	<p>工程設計 PROJECT ENGINEERING</p> 	<p>工程管理 PROJECT MANAGEMENT</p> 	<p>設備採購 EQUIPMENT PROCUREMENT</p> 
<p>機械製造 MACHINERY MANUFACTURING</p> 	<p>運輸管理 DELIVERY MANAGEMENT</p> 	<p>建廠安裝 CONSTRUCTION &amp; ERECTION</p> 	<p>試車訓練 TRAINING &amp; TEST RUN</p> 	<p>保證服務 GUARANTEE &amp; AFTER-SERVICE</p> 