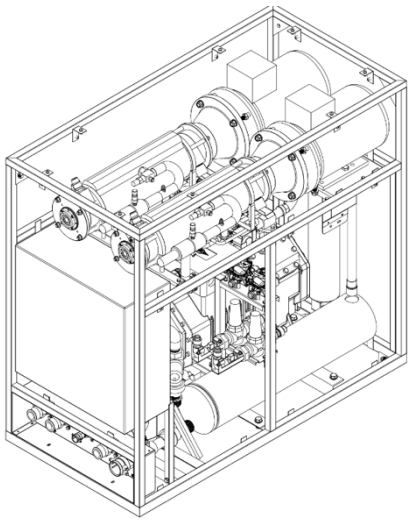
www.nanoiceglobal.com

PRINCIPAL GUIDELINES NM-3202

Technical info about our product and service

DIMENSIONS

- L= 1219 mm
- W= 609 mm
- H= 1112 mm (1200 mm w/ wheels)
- Weight= 420 Kg



For service request, see nanoiceglobal.com

POWER

- 14 Kw
- 400V (or 230 on demand)
- 3 phase
- 50 Hz or (60 Hz*)
- 32 Amp
- Connector 400V/32A/3 phase +N and Earth (N-leader not in use)
- 3 phase Connector to process pump (filter station)
- Phase direction of rotation «Clockwise» on the end of the ice generator (anti-clockwise on the motor side)

WATER-CONNECTION

- nanoICE outlet 1: 1" Camlock male
- nanoICE outlet 2: 1" Camlock male
- Process water in: 3/4"Camlock female
- Condenser water in: 1" Camlock female
- Condenser water out: 1" Camlock male

NanoICE AS, 6475 Midsund, NORWAY

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Other info

Refrigerant:
R452A

Condenser and process pressure requirements:

Minimum required water intake pressure {Liter = (gallons x 3.8)} and PSI

- Process water Min Flow: 1000 liters / hour @ 5psi (0.34 Bar)
  The pump provides up to 75 psi (5 Bar) for process water)
- Condense Water Min Flow: 2250 liters / hour @ 15psi (1 Bar) *Depends on water temperature.

Maximum Pressure water intake:
- Process water: 90psi (6.2 Bar)
- Condensation water: 150psi (10 Bar)

Salinity:
This nanoICE machine utilize Sodium Chloride (Salt) or Calcium Chloride to lower the freezing point of water; therefore, the machine must be connected to either a source of seawater, a nanoICE dosing system, or a premixed salt mixture with 2.5% - 3.5% salinity

Filtration:
Two 15-micron filter fitted to water intake after processpump (filter station) to prevent ingestion of foreign objects. A UV filter can also be installed on the filter unit to further purify

Flow & Capacity

ENGLISH

nanoICE Production Flow (NIPF)	Flow (gph)	Output (g $_{eq}$ / 24hr)	Cooling Capacity (BTU $_{eq}$ / 24hr)
nanoICE @ 15% Ice	252	25,235	1,200,000
nanoICE @ 25% Ice	172	17,224	1,341,682
nanoICE @ 35% Ice	92	9,213	960,000
Model: NM-3202			

METRIC

Flow (l/hr)	Output (l $_{eq}$ / 24hr)	Cooling Capacity (kcal $_{eq}$ / 24 hr)	Cooling Capacity (kW $_{eq}$ / 24 hr)
950	22,800	306,000	356
650	15,600	338,178	386
350	8,400	244,000	284
Model: NM-3202			

- Approx. 1 kcal is required to achieve one-degree temperature reduction in one kilogram of fish.
- Output of ice can be varied in flow and thickness and the table is based on a temperature of +5-8°C

Principal usage guideline for nano-ice

NanoICE is a revolution in food preservation that keeps food fresher longer, while drastically reducing bacterial growth and spoilage. Less than a micron in size, NanoICE particles allow for full contact with the surface of the product, causing nanoICE to remove heat from the product faster than any other ice technology on the market.

Optimizing the inherent benefits of nano-ice

The following is a summary of the methods of principal usage of nano-ice for various purposes, (A, B, C & D) based on our experience with various entities during an extended period of time and in our opinion the description under items C or D would be better suitable as testing protocols for fresh long term storage.

There are four main stages for using the nano-ice in its various forms:
A) catching / B) processing / C) Fresh storage / D) transportation process, also called "The nano-ice Quality & Cold-Chain"

A) First stage- Catching:

Chilling of fresh/live fish in either fish farming prior to killing or in reception areas in holding tanks onboard fishing vessels prior to bleeding/gutting.

5-10% thin nano-ice solution at -1,2°C to -1,5°C, depending on salinity in the seawater source, is used for this purpose of preventing heat buildup in the raw material in holding tanks / fish reception areas, ideally quickly lowering the raw material temperature from start temperature, without exceeding lower temperatures than +1 to +1,5°C since fish has not been bled or processed.

Maximum recommended storage: 24-30 hours, or until temperatures in fish/ice water exceeds +1°C, without drainage / depending on insulation of holding tanks.

Ice used straight from the machine and/or pumped from an OPTIONAL 1-5t nano-ice storage buffer tank containing the 5-10% thin nano-ice solution in larger volumes on demand.

B) Second stage - Processing:

Chilling of fresh fish after killing/bleeding/gutting/de-heading/grading of farmed fish and/or fresh fish at sea in holding tanks / RSW tanks. Helps bleed the fish better and faster thus also preventing heat buildup in the raw material during this important and heat sensitive processing stage.

15-20% medium thin nano-ice solution at -1,7°C to -2,0°C is used for this purpose of preventing heat buildup and continue/maintain the rapid pre-chilling of the raw material to as close to -0,5°C, prior to either fresh long terms storage in thick nano-ice (1-3 weeks as shown in C), processing and/or blast/plate freezing.

Maximum recommended storage: 36-48 hours without drainage, or until temperatures in fish exceeds -0°C and all the ice has melted. Then either drain all melted ice and re-apply 15-20% nano-ice solution and preserve fish below -0,5°C for another 24 hours / or process the fish / or place fish in thick nano-ice for storage as explained in C) below.

Ice used straight from the machine and/or pumped from an OPTIONAL 1-5t nano-ice storage buffer tank containing the 15-20% medium thin nano-ice solution in larger volumes on demand.

C) Third stage – Fresh Storage:
Storage of fresh whole fish (ideally also pre-chilled as in A+B) in drained fish boxes or tubs for 1 – 3 weeks onboard fishing vessels or during transportation in refrigerated cold storage/shipping containers prior to processing.

Storage temperature in cold storage/fish hold ideally set to -1°C in order to preserve the nano-ice for the maximum period of time, since nano-ice will cover the fish surface 100% but DOES NOT NEED TO MELT at +2-3°C as conventional ice in order to chill the fish.

Make sure to use DRAINED TUBS OR BOXES.

35-45% medium thick to thick nano-ice solution at -2,2°C to -3,0°C is used for this purpose, to chill the fish as quickly as possible to the desired and most ideal core storage temperature of -0,5 to -1°C.

For 3-5 days fresh storage: If ice is used straight from the machine without using an agitated nano-ice storage tank, produce ice in the maximum thickness at 35-40% ice concentration.

A setup with a nano-ice system without a nano-ice storage/buffer tank can be suitable for long-line boats and 2-3 day boats, when delivering thick nano-ice into fish boxes or tubs, as the catch is fed evenly into the process from the line. Also in processing facilities when the machine is set to constantly feed thin to medium thick ice into chilling/holding tanks in the processing area.

For 1-3 weeks fresh storage: Thick 40-45% drained nano-ice pumped from a nano-ice buffer/storage tank onto fish in boxes or tubs.

A setup with a nano-ice system with a nano-ice storage/buffer tank is required/highly recommended for all fishing vessels receiving their catch in large volumes each time, like trawlers, gillnetters etc. The machine´s ice production capacity is set to re-fill the nano-ice storage/buffer tank between catches. (…during 3-5 hour towing etc.)

D) Fourth stage – transportation storage:
Storage of fish products (fillets, loins etc.) in thick and drained nano-ice solution for transportation to market in corrugated/Styron boxes. (for retail)

Here, the nano-ice storage buffer tank is an essential component of the nano-ice system. The nano-ice buffer tanks are designed to lower the salinity in the ice, increase the ice% and minimize the water content in the ice prior to use in "retail" boxes when required.

The thickest nano-ice at 40-45% ice concentration is produced in the machine and delivered into the nano-ice tank. Temperature in the ice when entering the tank is estimated at -2,8°C to -3,2°C and salinity at 3% on average.

When pumped into the "retail" boxes, the ice % will be closer to 50 to 55%, salinity between 1 to 1,5% and temperature climbed to -2,4°C to -2,7°C.
If the "nano-ice Quality and Cold-Chain" from A to D is practiced, the fresh fish products will ideally be at -0,5°C when placed in the "retail" boxes (super-chilled) and less ice should be required for a normal transport of 3-5 days to market. If transport time is 6-9 days it becomes even more important to carry out the protocol from A to D above and only use slightly more nano-ice in the boxes.

nano-ice Buffer Tanks:
The nano-ice buffer tanks are optional and available 1 to 5 tons. All tanks are made of stainless steel, well insulated, with agitator and ice pump. The tanks are designed to hold the nano-ice solution "ready-to-use" in the desired ice% for 6-10 hours. Ice can be pumped in larger volumes when required for any application for increased efficiency and provide work savings in all ice distribution and handling.