

VERTICAL PLATE FREEZER

Application Date

Example

A customer requires 30 tons (30.5 tons metric) of fish fillets to be frozen over a period of 24 hours per day in 2" (50 mm) thick blocks. The refrigeration plant to operate on ammonia pump circulation.

	<u>Imperial</u>		<u>Metric</u>
Freezing Time		1 hour	
Weight	60 lb		27.3 kg
Number of cycles required per day		<u>24</u> 1 hour + 20 minutes	
	=	18 cycles	

The defrost times are already accounted for during the loading and unloading of a vertical installation.

Weight to be frozen each cycle	<u>67 200 lb</u> 18 cycles		<u>30 500 kg</u> 18 cycles
	=	3 730 lb	1 695 kg
Number of stations required	<u>3,730 lb</u> 60 lb per station		<u>1,695 kg</u> 27.3 kg per station
	=	62 stations	62 stations

Selection will be two 30-station vertical freezers giving a slightly reduced capacity.

Refrigeration Capacity

Total heat content of fish fillet to be removed at +50°F (+10°C) when freezing to an average temperature of 0°F (-18°C) is:

	142 BTU/lb	79 K.Cals/kg
Adding 20%	142 x 1.2 = 170 BTU/lb	79 x 1.2 = 95

When more than one freezer is to be used on a common system the total refrigeration capacity can be reduced by 5%, up to a maximum of 15% providing the loadings are staggered.

	<u>170 BTU/lb x 1800 lb</u> 1 hour		<u>95 K.Cals/kg x 819 kg</u> 1 hour
	= 306 000 BTU/hour		= 77 805 K.Cals/hour
The total duty-required:	306 000 BTU/hour + 0.95 x 306 000		77 805 K.Cals + 0.95 x 77 805

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Average Weight of Various Products

A standard vertical plate freezer with plate dimensions of 44"x22" (1120x558 mm) produces a block with dimensions of 41½"x20" (1060x520 mm). For a product with specific gravity of 1, a 100mm (4") block will have a weight of 55.1 kg. (121.2 lbs).

The table below gives specific gravities of various products.

PRODUCT	SPECIFIC GRAVITY
Whole Fish (head on) cod and haddock	0.82
Whole Fish (headless) cod and haddock	0.89
Sprat and herring	0.95
Fish fillets	1.02
Fruit	0.57
Fruit Pulp	0.90
Vegetables	0.49
Liquid Egg	0.69
Boneless Meat (joints)	0.82

From the above factors, a fillet block of 1060 x 520 x 65 mm would weigh approximately 36.5 kg.

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APPROXIMATE FREEZING TIMES

SYSTEM: PUMP CIRCULATION

EVAPORATION TEMPERATURE: -30°F (-34°C)

PRODUCT	PRODUCT THICKNESS AND FREEZING TIMES		
	2" (50 mm)	3" (76 mm)	4" (100 mm)
Fish Fillets	60 mins	105 mins	165 mins
Whole White Fish	75 mins	120 mins	180 mins
Herrings/Sprat	60 mins	110 mins	170 mins