035

EXPLANATION NOTE
FOR
COMMENTS AND RECOMMENDATIONS
FROM
GERCO CO, THE ARAB REPUBLIC OF EGYPT

FEASIBILITY STUDY
FOR
COLD STORAGE CHAIN
DEVELOPMENT PROJECT

FEBRUARY 1984

JAPAN INTERNATIONAL COOPERATION AGENCY

شركة جركو للتبريد والهندسة
احدى شركات وزارة التموين

المركز الرئيسى
١١ شارع عماد الدين — القاهرة
ص.ب ١١٢٢٢
كيس بريد القاهرة
ت : ٧٥١٠٩٩ ، ٧٥١٤٢٨ ، ٧٦١٢١٤
تلغرافياً (جركو) القاهرة
تلكس UN ٩٢٢٥٦ جركو

GERCO CO.
CAIRO. DECEMBER 1983

JICA

Dear Sirs

Refering to the protocol signed between Gerco And THE Japanese commette on November 13. Concerning the draft of the final preleminary report (MAIN & APPENDEX) about the cold store chain .
We attached herewith some notes on this report, if any other observations will the noticed We shall inform you — later about it

With our best regards

GERCO CO.

M. Zakaria

10/21/83

Some remarks on the cost of Petrol Import.

L.E/ton = 850 - 1200 with freight
Low-High

Without Freight

ABBAS 2000 tons (Appendix B-31 Page 4)

3,246,400 - 432,400 = 2,814,000 L.E.

L.E./t.. = 1405 F.O.B. too high

SHERIF 3000 tons (Appendix B-31 Page 5)

4,239,700 - 579,600 = 3,660,100 L.E.

L.E./t. = 1220 F.O.B. high

SUEZ 3000 tons (Appendix B-31 Page 6)

4,060,700 - 577,300 = 3,483,400 L.E.

L.E./t. = 1161.13 F.O.B. high

GAMARA 3000 tons (Appendix B-31 Page 7)

4,529,200 - 616,100 = 3,913,100 L.E.

L.E./t. = 1304.36 F.O.B. too high

K.F M. L.

RAMADA 3000 tons (without Freight & meat processing) (Appendix B-31 Page 8)

		L.E.
Temporary works		56,500
Building	1,641,700 x 3/4	1,230,900
Supervisor		51,100
Mechanical	63,100 x 3/4	47,325
Elec. works	110,100 x 3/4	82,575
Supervisor (mech. & Elec.)		16,700
Dispatch		239,400
General		193,800
Foundation	718,800 x 3/4	539,100
Cooling equip.	1,049,400 x 4/5	839,520
Pallets		190,000
Insulated trucks		83,300
Phisical contingency		689,400
	Total	4,259,620

L.E./ton = 1420 F.O.B. too high

EL-DEKHILA 6000 tons (without Freight & meat processing) (Appendix B-31 Page 9)

		L.E.
Temp. works		84,900
Building	2,505,400 x 3/4	1,879,050
Supervisor		51,100
Mech. works	94,400 x 3/4	70,800
Elec. works	162,900 x 3/4	122,175
Supervisor (mech. & Elec.)		16,700
Dispatch		239,400

K. F. M. Z.

General Expenses		291,500
Foundation	1,160,900 x 3/4	870,675
Cooling equip.	1,218,200 x 4/5	974,560
Pallets		380,000
Trucks & Fork lifts		516,700
Phisical Contingency		954,400
	Total	6,451,960

L.E./t. = 1075.3 F.O.B.

ALEX 4000 tons (without Freight & meat processing) (Appendix B-32 Page 8)

7,674,873 - 1,319,887 = 6,354,986 L.E.

L.E./ton = 1589 F.O.B. Too high

ALEX 2000 tons (without Freight & meat processing) (Appendix B-32 Page 9)

		L.E.
Temp. works		72,000
Building	1,299,000 x 3/4	974,250
Supervisor		51,600
Mech.	87,000 x 3/4	65,250
Elec.	112,200 x 3/4	84,150
Supervisor (mech. & elec.)		16,500
Dispatch		270,000
General		156,600

K. F. M. 2

Foundation	606,300 x 3/4	454,725
Outside (?)		343,300
Cool. equip.	1,133,570 x 4/5	906,856
Pallets		130,000
Fork lifts		66,667
	Total	3,591,898

L.E./ton = 1796 F.O.B. Too high.

- Page 68 (main report)

Storage capacity factor 3.5 is not usually acceptable now in Egypt. A factor of 4 or 4.5 is more likely. This factor has been developed from the pallets arrangement experience in Egypt.

- Page 70 (main report)

Pallets dimensions used widely are 1 x 1.2 x 1.85 m and not 1 x 1.2 x 1.75 m as stated in the report. This will reduce the air circulation inside the rooms and pallets capacity. Also, the normal clearance between the pallets is 5 cm not 1 cm as stated.

The free passage for the fork lift is given 3 m while it should be not less than 3.5 m for a cold store with a hight of 8 m.

- Page 76 (main report)

Wall and ceiling thicknesses are very small, specially for the negative temperatures. The acceptable thicknesses are 200 mm. Also, the K factor is not stated.

K. F. M. Z.

- Page 78 (main report)

  Screw compressor will not be utilized by GERCO.
  Compressor capacities and systems must be revised.

- Page 109 (main report)

  Leveling cost is not included in the study. Should be included.

—

K.F. M. Z.

APPENDIX B 31 Page 4 - 10

In the study, the plant life is assumed 30 years.

It is noticed that during that period the cost of the pallets and fork lifts are considered once only. In the economical study the cost for replacing these items several times must be considered due to their short life span.

APPENDIX B 31 Page 1 - 10

No information can be found or given about how the different base costs are estimated.

Page 140 Main Report

It has been stated in the study that from the trade statistics the standard conversion factor is 0.8 from table 26 page 145 indicates that many items which affect the conversion factor are droped out.

This conversion factor must be revised careful, and complete justification is required.

Page 143 Main Report Item VI - 2 - 3

SCF for L/C is stated to be 0.8 while F/C is 1.00 Justification for that is required.

Page 141 Main Report

Benefit from Demur-age is the only factor that is considered in the report. Why did the report exclude the benefit coming from storing the products in these cold stores under study instead of renting spaces in otner stores, or, even benefit from renting space to others ?

Page 68 (Main Report)

Re: Storage Capacity Factor

1. The storage capacity factor of 3.5 (m^3/ton) has already been agreed upon in the meeting on the 30th day of August 1982 between the GERCO staff and the Japanese Survey Team. This agreement can be confirmed in the document acknowledged by Mr. Hussein Fahmy, the Chairman of GERCO and Mr. D. Iseno, Team Leader of the Japanese Survey Team on the 13th of September 1982. This document has the note under the heading of the "Proposed Storage Capacity" which reads that "The storage capacity (ton) is calculated by dividing the total space volume (m^3) by 3.5 (m^3/ton)."

2. For your reference, the regulation in Japan is 2.5 (m^3/ton). Therefore, the storage capacity factor of 3.5 (m^3/ton) requires 40% more space of storage than in Japan. If the factor of 4 or 4.5 (m^3/ton) will be required, the construction cost of the storage will become very high.

Page 70 (Main Report)

Re: Pallets Dimension

The pallets dimension of 1 x 1.2 x 1.75 m have been confirmed by the field survey of the new storage at SUEZ. The height of 8 m from the floor surface to the ceiling will allow the 4 piling pallets with the height of 1.85 m each, leaving space of 0.6 m sufficient for good air circulation from the top of the pallets to the ceiling.

Re: The clearance of the pallets

The clearance of the pallets should have been 10 cm and not 1 cm. It was topographical error.

Re: The Free Passage for the Forklift

The free passage of 3 m is enough for the forklift to move and revolve. (Refer to Attachment 1)

Page 76 (Main Report)

Re: The Wall and Ceiling Thickness

The proposed insulation panel is 2.5 times more effective than the traditional insulation panel.

The K factor of the proposed insulation panel is 0.018 $KCal/m^2h°C$ against 0.045 $KCal/m^2h°C$ of the traditional insulation panel.

Therefore, the proposed insulation panel can be made more thin than the traditional one, enabling the capacity of the storage to be larger. (Refer to Attachments 2-1 & 2-2)

Page 78 (Main Report)

Re: Screw Compressor

Generally speaking the screw compressor is as mentioned on page 78 of the Draft Final Main Report, recommended for easy maintenacne with small numbers of spare parts and longer maintenance-free time. Furthermore, the central control method thereof can be employed, resulting in low running costs, smooth centralized machine control, and so on.

Measures for Trouble

1. Since a screw-type-compressor has lesser vibrating portion than a piston-type-reciprocating-compressor, the former has a smaller number of parts than the latter has (about one-third), and further the screw compressor happens lesser trouble than the piston compressor. The screw compressor can operate for about 30,000 hours, or three to four years without overhauling it. Accordingly, it requires lesser annual maintenance cost compared with that of the piston compressor. The screw compressor has long durability because it has enough power to resist ammonia's flowing backward into a compressor.

2. Numerous numbers of screw compressors have been utilized for more than ten years in all over the world and in every industrial fields. Especially chemical industry, which is very sensitive to safety and trouble free operation does not miss to utilize the screw compressor because of its high durability of machines.

3. In case of emergency, a stand-by compressor is designed to be installed.

Special Feature

1. A screw-type-compressor is available for bigger size of refrigeration complex. Such typical characteristics as huge refrigeration capacity per unit, small in size and light in weight makes the machine room small and less piping and wiring works at the plant site, compared with a conventional piston-type-reciprocating-compressor. As a whole, very economical refrigeration plant can be expected by the screw compressor.
2. Since the screw compressor can achieve a high compression ratio and has a higher compressing efficiency, its refrigeration capacity is bigger than that of the piston-type-reciprocating compressor.

3. As for the capacity control, a non-step capacity control is possible from 10% to 100% with the screw-type-compressor, which makes the refrigeration plant economically because of the right operation condition for the required temperature condition. In a long run, the non-step capacity control that is impossible in the piston compressor, leads to the energy saved operation and easy automatic control of the plant.

Page 109 (Main Report)

Re: Levelling cost of the land

The land of the site for the cold storages in Cairo, Port-Said Suez, and Alexandria, does not require any substantial work of levelling. The cost for levelling work, when required, will be very low and can be estimated in the course of the detailed design.

APPENDIX B

Re: Cost Estimate

1. For the purpose of estimating the F.O.B base cost including the physical contingencies, the freight and insurance cost not only for the building works but also for the other items must be deducted from the C.I.F base cost.

2. When calculating F.O.B base cost, not only the freight and insurance cost but also the physical contingency for the freight and insurance should be excluded from the C.I.F base cost.

3. The calculation of F.O.B base cost for each cold storage is shown in the table of Unit Cost on the F.O.B base. The cost comparison of each storage is also shown in the following tables.

4. The cost for the building works and cooling equipment of the RAMADA storage is assumed to be the same as that of the GHAMRA storage.

5. In this case, the cost ratios for the building works, foundation works, cooling equipment, pallet and forklift only for the cold storages excluding meat processing facilities are 62%, 70%, 74%, 100% and 100% respectively, against the total base cost of the RAMADA cold storage with meat processing facilities.

6. The average unit cost per ton in Japan for cold storages including the cost for building works and cooling equipment ranges from LE 500 to LE 750. For the purpose of comparison between this cost and the proposed cost, some adjustments should be made with regard to such as the storage capacity

factor, outdoor temperature and the ceiling height of the building, which are 1.4 times, 1.17 times and 1.3 times higher respectively in Egypt against those in Japan, because the storage capacity factor in this project plan is 3.5 m^3/ton against 2.5 m^3/ton being adopted in Japan, the K factor of the outdoor temperature is 0.1158 in Egypt against 0.1351 in Japan, and the height of the building is proposed to be 8 m in this project plan against average height of 6 m in Japan.

The cost for the construction of building will be 1.1 times higher in Egypt than in Japan because of the higher ceiling.

The average unit cost in Japan, when adjusted as mentioned above, will be ranging from 270,000 to 406,000 in terms of Japanese Yen and from 903 to 1353 in terms of Egyptian Pounds.

It is noted that the unit cost on the F.O.B base for each of the cold storage is in the range of these adjusted cost estimates.

Therefore, it can be said that the project cost in terms of F.O.B base is not higher than the cost in Japan after being adjusted to the Egyptian conditions.

Unit Cost on the F.O.B. Basis

(excluding the cost for the meat processing facilities)

(Unit : LE/ton)

Name of Storage	Abbas	Sherif	Suez	Ghamra	Ramada
Capacity (ton)	2,000	3,000	3,000	3,000	3,000
Building Works	619	521	566	544	544
Foundation Works	225	254	138	358	193
Cooling Equipment	307	233	239	235	235
Pallet	72	70	70	70	70
Forklift	30	30	35	25	25
Total	1,253	1,108	1,048	1,232	1,066
	Unit Cost is a little bit higher than any other cold storages because of the small capacity.			Foundation works include the piling works.	

Cost Comparative Table

Name of Storage : Abbas

Capacity : 2,000 tons

C.I.F. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,126.2	432.4	155.9	1,714.5	857
2. Foundation Works	392.0	-	58.8	450.8	225
3. Cooling Equipment	558.3	97.5	65.6	721.4	361
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	130.0	-	13.0	143.0	72
6. Insulated Truck	120.3	29.7	-	150.0	75
7. Forklift	60.3	6.4	-	66.7	33
8. Total	2,387.1	566.0	293.0	3,246.4	1,623

F.O.B. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,126.2	-	112.6	1,238.8	619
2. Foundation Works	392.0	-	58.8	450.8	225
3. Cooling Equipment	558.3	-	55.8	614.1	307
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	130.0	-	13.0	143.0	72
6. Insulated Truck	-	-	-	-	-
7. Forklift	60.3	-	-	60.3	30
8. Total	2,266.8	-	240.2	2,507.0	1,253

Cost Comparative Table

Name of Storage : Sherif

Capacity : 3,000 tons

C.I.F. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,421.8	579.6	200.1	2,201.5	734
2. Foundation Works	662.0	-	99.3	761.3	254
3. Cooling Equipment	635.2	108.3	74.4	817.9	273
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	120.3	29.7	-	150.0	50
7. Forklift	90.4	9.6	-	100.0	33
8. Total	3,119.7	727.2	392.8	4,239.7	1,414

F.O.B. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,421.8	-	142.2	1,564.0	521
2. Foundation Works	662.0	-	99.3	761.3	254
3. Cooling Equipment	635.2	-	63.5	698.7	233
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	90.4	-	-	90.4	30
8. Total	2,999.4	-	324.0	3,323.4	1,108

Cost Comparative Table

Name of Storage : Suez

Capacity : 3,000 tons

C.I.F. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,544.5	577.3	212.2	2,334.0	778
2. Foundation Works	360.6	-	54.1	414.7	138
3. Cooling Equipment	652.0	108.3	76.0	836.3	279
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	120.3	29.7	-	150.0	50
7. Forklift	105.5	11.2	-	116.7	39
8. Total	2,972.9	726.5	361.3	4,060.7	1,354

F.O.B. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,544.5	-	154.5	1,699.0	566
2. Foundation Works	360.6	-	54.1	414.7	138
3. Cooling Equipment	652.0	-	65.2	717.2	239
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	105.5	-	-	105.5	35
8. Total	2,852.6	-	292.8	3,145.4	1,048

Cost Comparative Table

Name of Storage : Ghamra

Capacity : 3,000 tons

C.I.F. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,483.1	616.1	209.9	2,309.1	770
2. Foundation Works	932.9	-	140.0	1,072.9	358
3. Cooling Equipment	640.5	136.7	77.7	854.9	285
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	75.3	8.0	-	83.3	28
8. Total	3,321.8	760.8	446.6	4,529.2	1,511

F.O.B. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,483.1	-	148.3	1,631.4	544
2. Foundation Works	932.9	-	140.0	1,072.9	358
3. Cooling Equipment	640.5	-	64.1	704.6	235
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	75.3	-	-	75.3	25
8. Total	3,321.8	-	371.4	3,693.2	1,231

Cost Comparative Table

Name of Storage : Ramada

Capacity : 3,000 tons (Excluding Meat Processing Plant)

C.I.F. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,483.1	616.1	209.9	2,309.1	770
2. Foundation Works	503.2	-	75.5	578.7	193
3. Cooling Equipment	640.5	136.7	77.7	854.9	285
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	75.3	8.0	-	83.3	28
8. Total	2,892.1	760.8	382.1	4,035.0	1,345

F.O.B. basis

(Unit : LE 1,000)

	Base Cost	Freight & Insurance	Physical Cont.	Total	Unit Cost (LE/ton)
1. Building Works	1,483.1	-	148.3	1,631.4	544
2. Foundation Works	503.2	-	75.5	578.7	193
3. Cooling Equipment	640.5	-	64.1	704.6	235
4. Meat Processing Facility	-	-	-	-	-
5. Pallet	190.0	-	19.0	209.0	70
6. Insulated Truck	-	-	-	-	-
7. Forklift	75.3	-	-	75.3	25
8. Total	2,892.1	-	306.9	3,199.0	1,066

Reply to the Comments prepared by GERCO

1. Replacement Cost

Although no description about the replacement cost has been given in the draft final report, the following costs have been taken into account in the economic evaluation;

Item	Cost* (LE '000)	Durable Life (Year)	Counted Time
Insulated Truck and Forklift	1,417	10	2
Pallet	1,016	10	2
Meat Processing Facility	2,325	15	1
Cooling Equipment	6,091	20	1

Note: * In terms of economic cost

2. Breakdown of Initial Cost

This will be compiled in the Appendix of the Final Report.

3. Standard Conversion Factor

The equation for Standard Conversion Factor (SCF) applied in the draft final report, was quoted from "Social Cost-Benefit Analysis: A Guide for Country and Project Economists to the Derivation and Application of Economic and Social Accounting Prices" (World Bank Staff Working Paper No.239), based on which the SCF can be computed by total amount of import and export, total amount of duties and taxes for import and export, and total amount of export subsidies. (As for the equation, reference is made to page 140 of Main Report)

According to the tariff table of Egypt, trade items are divided into 21 sections, 99 chapters and 1095 paragraphs. Tables 1 to 4 show the aggregated sum of import duties and taxes by section after calculating import duties and taxes by paragraph, and Table 5 shows total amount of export duties and taxes.

Thus, the SCF applied in the draft final report has been computed on the basis of the total amount of import and export given in the foreign trade statistics as well as the total amount of duties and taxes for import and export as mentioned above, the SCF is well justified. (Refer to Attachment 3)

4. Application of SCF for Local Currency Portion

The project cost is composed of foreign currency portion and local one. According to the project evaluation standard adopted by the World Bank, in the economic evaluation, prices of those goods and services in foreign currency portion are equivalent to their border prices, because they are estimated on the basis of the world market prices, on the other hand, it is necessary to adjust those prices of goods and services in local currency portion through their world market prices, because they are estimated on the basis of the Egyptian domestic market prices which are affected by the Egyptian tariff policy, price policy as well as monopolized price mechanism and so on. The reason to apply the world market prices as the standard is that the world market prices have more competitive mechanism of price determination than the Egyptian ones.

Theoretically speaking, it is necessary to compute the respective conversion factor for goods and services in local currency portion, but in the draft final report, the SCF has been applied for this price adjustment which is representative conversion factor for every goods and services due to lack of necessary data and informations.

5. Project Benefit

In estimating a project benefit, it is necessary to consider the difference between benefits in cases of "With Project" and "Without Project."

In case of "Without Project," the following two measures are to be taken into consideration to cope with the gap between the projected import amount of cold foodstuff and the total capacity of cold storages owned by the Public Sector;

(a) to rent other cold storages (Private Sector) in the territory of Egypt.

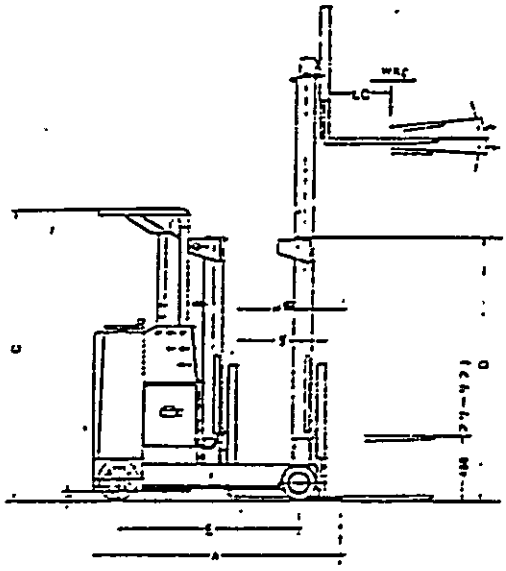
(b) to utilize cargo ships as temporary cold storages which carry cold foodstuffs into Egyptian ports.

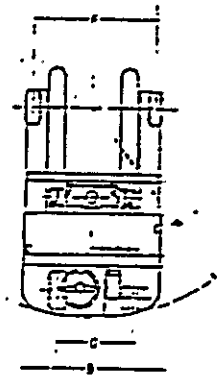
In case of "With Project", the project benefit will arise from reduction of rental charges to be paid to other cold storages in the item (a) and/or reduction of demurrages in the item (b).

In the draft final report, the project benefit has been estimated as the said gap would be dealt with by only the item (b), because necessary data on the available capacity of cold storages owned by the Private Sector were not available. Further, the benefit arising from renting the proposed cold storages to others has been excluded in order to avoid double counting of project benefit, because the proposed cold storages shall be exclusively utilized for imported cold foodstuffs handled by the Public Sector.

During the detailed design stage, it is recommended that re-estimation of the project benefit in the form of combination of the said two items (a) and (b) shall be made through collection of necessary data on the cold storages owned by the Private Sector.

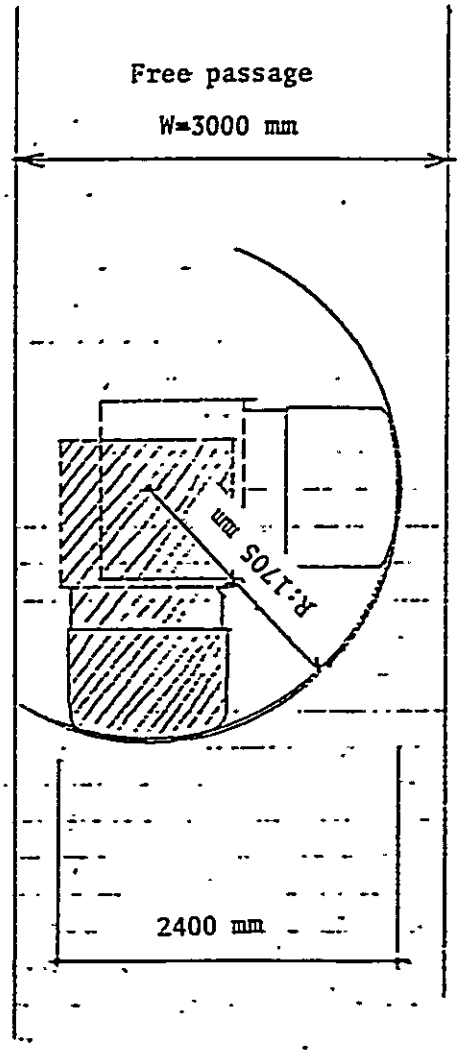
Design for Free Passage of Forklift



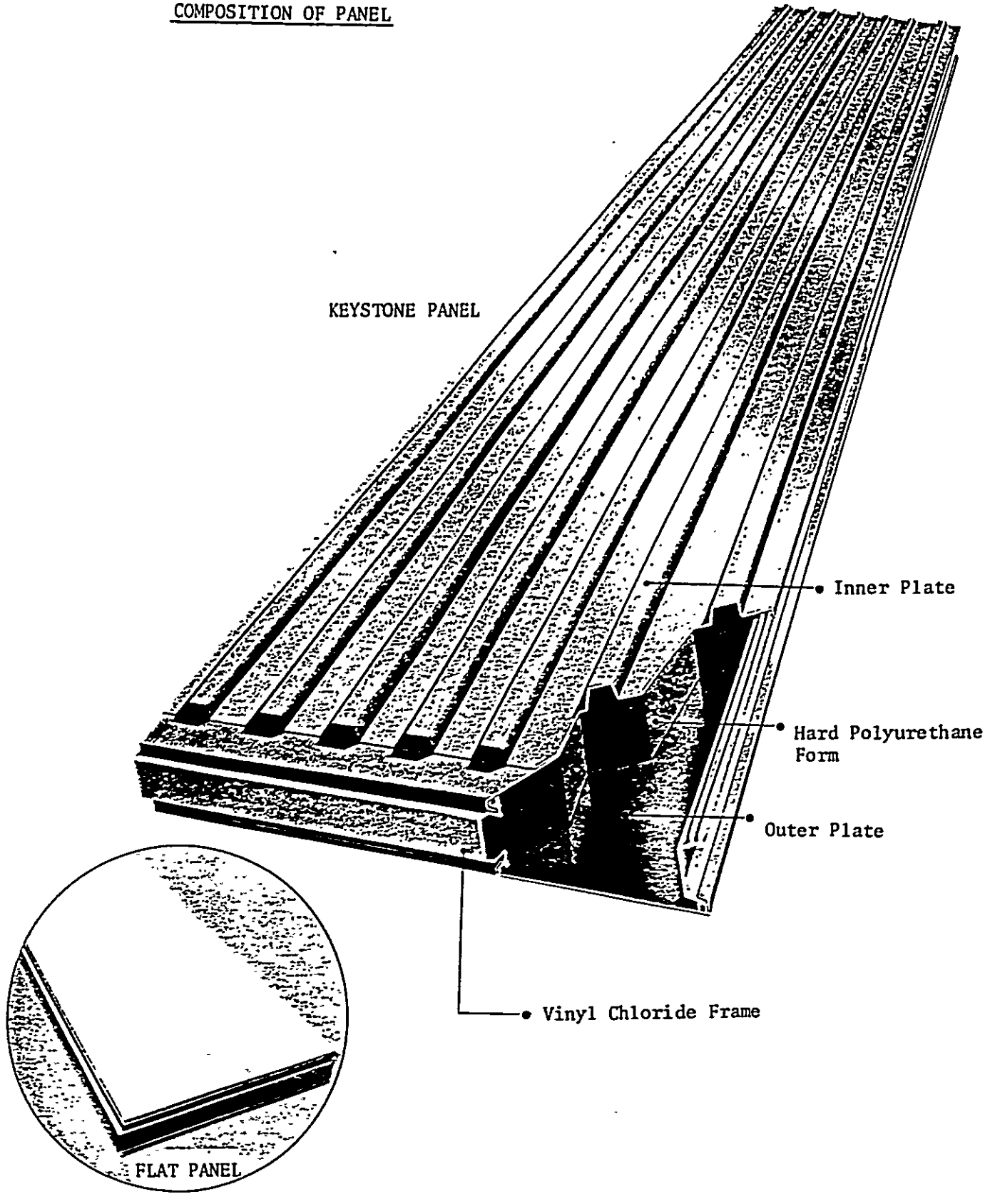


Major Specification of Forklift

Length (A)	1975 mm
Width (B)	1050 mm
Height (C)	2200 mm
Mast (D)	1995 mm
Wheelbase (E)	1500 mm
Front Tread (F)	950 mm
Back Tread (G)	600 mm
Minimum Turning Radius	1705 mm



COMPOSITION OF PANEL



3

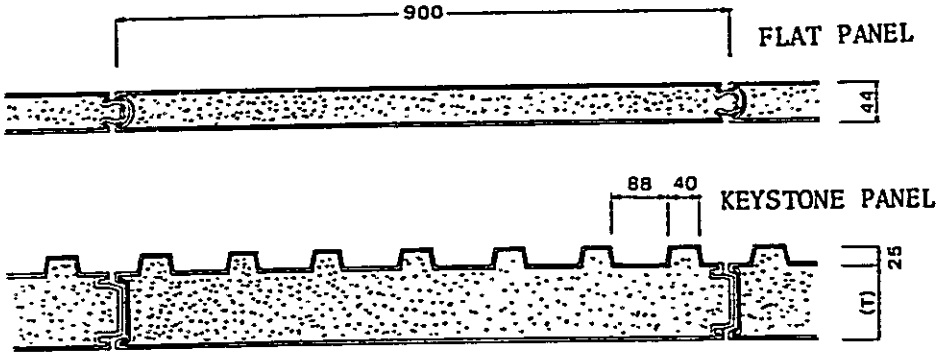
SPECIFICATION OF PANEL

Keystone Panel

Type	Thickness (mm)	Applicable Temperature (°C)	K-Value ($Kcal/m^2h°C$)
KA	44 + 25	+60 to -5	0.354
KG	62 + 25	0 to -10	0.264
KE	77 + 25	-10 to -25	0.218
KB	92 + 25	-20 to -30	0.188
KF	100 + 25	-20 to -40	0.175
KC	127 + 25	-25 to -50	0.142
KJ	152 + 25	-35 to -55	0.125
KS	202 + 25	-35 to -55	0.096

Flat Panel

Type	Thickness (mm)	Applicable Temperature (°C)	K-Value ($Kcal/m^2h°C$)
A	44	+60 to -5	0.415
G	62	0 to -10	0.296
E	77	-10 to -25	0.240
B	92	-20 to -30	0.205
F	100	-20 to -40	0.188
C	127	-25 to -50	0.151
J	152	-35 to -55	0.131
S	202	-35 to -55	0.100



Social Cost-Benefit Analysis: A Guide for Country and Project Economists to the Derivation and Application of Economic and Social Accounting Prices

World Bank Staff Working Paper No. 239

August 1976

TABLE OF CONTENTS

2.02 We derive, first of all, the standard conversion factor (α) and then a number of specific conversion factors for non-traded goods and services, such as transportation (β_t) and electricity (β_p), for producer goods (β_k) and consumption goods (β_c) and for the consumption of specific income groups. Finally we derive a conversion factor for labor (β_l). Although labor is often revalued at shadow prices by first calculating the number of man hours which are implicit in the financial statements based on market wages, and then multiplying this man hour figure by the shadow wage rate; it is considerably easier to multiply the cost of labor at market prices by a conversion factor equal to the ratio of the shadow to the market wage rates. This is the same one-step conversion factor approach which has been used for all other resources in this paper.

Standard Conversion Factor (α)

2.03 The standard conversion factor (α) is used to give the economic/social accounting prices of goods which cannot be revalued at border prices because of constraints on information, time, etc. It is particularly useful in (a) the calculation of other basic parameters, where national values that are not project-specific are needed, and in (b) the revaluation of minor non-traded goods for which specific conversion factors are not available. But, unless the specific conversion factors are all very similar to α, it is a good rule to use α as sparingly as possible, as it is an average, and to use specific conversion factors whenever possible.

2.04 It is assumed in what follows that the existing extent and degree of protection is unlikely to be altered in any significant way. 1/ Inverting Balassa's foreign exchange conversion ratio 2/ and using our own notation we have:

$$\alpha = \frac{\varepsilon(\bar{X}_1) + \pi(\bar{M}_1)}{\varepsilon \bar{X}_1 \cdot (1-t_x)] + \pi \bar{M}_1 (1+t_m)} \qquad (1)$$

where:

α = standard conversion factor = ratio of the official exchange rate (OER) to the shadow exchange rate (SER)

ε = elasticity of exports

π = elasticity of imports

1/ For a contrary assumption see "Estimating the Shadow Price of Foreign Exchange in Project Appraisal," Economic Staff Working Paper No. 142, February 1973, prepared by Bela Balassa.

2/ Ibid p. 26.

X_i = value of exports of i number of goods

M_i = value of imports of i number of goods

t_x = ad valorem taxes on exports (negative if subsidies)

t_m = ad valorem taxes on imports

2.05 Equation (1) expresses the weighted average of the ratio of world (border) to domestic prices of imports and exports by estimating the weighted average of the rates of protection of imports and exports, with the weights being the respective elasticities. This is a second-best situation, and the weights would be different if we assumed a movement to a first-best or free-trade position. 1/

2.06 Import and export elasticities are not readily available in all countries, and in any case Balassa's formula implicitly assumes that a marginal increase in foreign exchange resulting from a project leads to an adjustment of the exchange rate, which is why Balassa uses price elasticities to weight imports and exports. But, if the marginal increase is used by a Government to increase investment, no adjustment to the exchange rate need take place. Hence, if we drop Balassa's implicit assumption or alternatively assume that the elasticities all equal one, the equation reduces to:

$$\alpha = \frac{M+X}{M(1+t_m) + X(1-t_x)} \qquad (2)$$

For some estimation purposes, it is simpler to rewrite equation (2), using values of taxes instead of tax rates as follows:

$$\alpha = \frac{M+X}{(M+T_m) + (X-T_x)}, \qquad (3)$$

where T_m = value of taxes on imports, and

T_x = value of taxes on exports.

1/ Ibid, p. 26. According to Balassa the difference is that under continuing protection point elasticities are used, whereas under free-trade arc elasticities are employed.

2.07 The numerator of equation (3) is the value of traded goods at border prices, while the denominator is the value of the same or similar goods at domestic market prices (excluding transport, handling and marketing margins). However, where there are significant differences between the value of actual trade tax receipts and the potential value as determined by the tax rates, an analysis of the reasons for the discrepancies needs to be made and taken into account. In such cases, it is probably better to use equation(2). 1/

2.08 It should be noted that nothing has been said so far about quantitative trade restrictions. Formally, this can be met by including an additional item in equations (1), (2) and (3), say tQ_m, representing the tariff equivalent of quantitative restrictions. This would be done by expressing the border price of each good subject to a quota or restriction as a percentage of the domestic retail market price less a transport/marketing margin. But it has to be recognized that this is not easy to do and may take considerable time.

2.09 Equation (3) can be simplified still further to:

$$\alpha = \frac{M}{MT_m} \qquad (4)$$

if the proportion of the marginal expenditure on export items at domestic prices is approximately zero, i.e., the exportable items in equation (3) are a negligible proportion of domestic non-traded items.

Conversion Factor for Consumption (β_c) and Producer Goods (β_k)

2.10 If the trade and public revenue accounts are sufficiently disaggregated, it is desirable to break down α into conversion factors for consumption (β_c) and Producer Goods (β_k). Producer goods are defined as capital goods, intermediate goods and raw materials. If a recent consumer's budget survey is available β_c should be estimated using consumption rather than trade weights

---

1/ See Guidelines for the Economic Appraisal of Projects in the Lower Mekong Basin, ESCAP, Committee for Coordination of Investigations of the Lower Mekong Basin, Volume II, "Calculations for Conversion Factors for Thailand", Bangkok, 1975 (To be published).

TABLE - 1

***** CALCULATION OF IMPORT DUTIES AND TAXES *****

YEAR: 1978

SECTION	IMPORT AMOUNT	++++++++++++++++++++++++++ TOTAL OF IMPORT DUTIES AND TAXES ++++++++++++++++++++++++++ IMPORT DUTY	STATISTICAL TAX	C.E.B. TAX	MARINE TAX	MUNICIPALITY TAX	TOTAL
1	95175.	13291.	952.	85.	476.	444.	15248.
2	366575.	56040.	1970.	19614.	1833.	2384.	81841.
3	69240.	5904.	692.	913.	346.	236.	8091.
4	155405.	55962.	1554.	8112.	777.	1992.	68397.
5	96737.	20105.	967.	3466.	484.	751.	25772.
6	210962.	27409.	2110.	11232.	1055.	1254.	43060.
7	87454.	20925.	875.	6184.	437.	853.	29273.
8	4044.	981.	40.	75.	20.	33.	1149.
9	114697.	19333.	1147.	6629.	573.	830.	28512.
10	63921.	14820.	639.	3661.	320.	583.	20023.
11	62484.	34940.	625.	4994.	312.	1226.	42098.
12	1487.	801.	15.	149.	7.	29.	1001.
13	39614.	35108.	396.	3901.	198.	1188.	40792.
14	7521.	1900.	75.	720.	38.	82.	2815.
15	235339.	61257.	2353.	21074.	1177.	2576.	88436.
16	575436.	148071.	5754.	39538.	2877.	5887.	202127.
17	389832.	255601.	3898.	18037.	1949.	8385.	287870.
18	41114.	7315.	411.	3797.	206.	352.	12081.
19	1181.	396.	12.	118.	6.	16.	548.
20	13968.	8603.	140.	1255.	70.	302.	10370.
21	5.	1.	0.	0.	0.	0.	1.
TOTAL	2632191.	788760.	24626.	153555.	13161.	29403.	1009505.

NOTE: C.E.B. TAX = CONSOLIDATION OF ECONOMIC DEVELOPMENT TAX

TABLE - 2

***** CALCULATION OF IMPORT DUTIES AND TAXES *****

YEAR: 1979

SECTION	IMPORT AMOUNT	++++++++++++++++++++++++++ TOTAL OF IMPORT DUTIES AND TAXES ++++++++++++++++++++++++++ IMPORT DUTY	STATISTICAL TAX	C.E.B. TAX	MARINE TAX	MUNICIPALITY TAX	TOTAL
1	109721.	15886.	1097.	129.	549.	530.	18190.
2	360438.	55773.	1861.	19717.	1802.	2375.	81528.
3	94693.	12454.	947.	1972.	473.	475.	16322.
4	143197.	43586.	1432.	8371.	716.	1623.	55728.
5	129872.	33889.	1299.	2053.	649.	1137.	39027.
6	195780.	26042.	1958.	9663.	979.	1159.	39800.
7	81251.	19552.	813.	5349.	406.	784.	26902.
8	3335.	788.	33.	55.	17.	27.	920.
9	104278.	17864.	1043.	6077.	521.	765.	26270.
10	55744.	13248.	557.	3383.	279.	524.	17991.
11	77295.	31381.	773.	5998.	386.	1156.	39695.
12	2202.	1176.	22.	220.	11.	43.	1472.
13	32753.	20320.	328.	2867.	164.	710.	24388.
14	2033.	759.	20.	159.	10.	28.	977.
15	322442.	70760.	3224.	29913.	1612.	3165.	108675.
16	548346.	126766.	5483.	36200.	2742.	5136.	176327.
17	354711.	229470.	3547.	15975.	1774.	7523.	258288.
18	47539.	8775.	475.	4360.	238.	415.	14264.
19	840.	248.	8.	84.	4.	10.	355.
20	19739.	12300.	197.	1699.	99.	429.	14724.
21	4.	0.	0.	0.	0.	0.	1.
TOTAL	2686213.	741037.	25119.	154243.	13431.	28015.	961844.

NOTE: C.E.B. TAX = CONSOLIDATION OF ECONOMIC DEVELOPMENT TAX

TABLE - 3

***** CALCULATION OF IMPORT DUTIES AND TAXES *****

YEAR: 1980

SECTION	IMPORT AMOUNT	TOTAL OF IMPORT DUTIES AND TAXES ++++++++++ IMPORT DUTY	STATISTICAL TAX	C.E.B. TAX	MARINE TAX	MUNICIPALITY TAX	TOTAL
1	210194.	27049.	2102.	111.	1051.	909.	31222.
2	545117.	54297.	2362.	27910.	2726.	2619.	89913.
3	152606.	32813.	1526.	7280.	763.	1271.	43653.
4	200623.	68096.	2006.	7283.	1003.	2952.	101339.
5	155943.	37812.	1559.	3609.	780.	1313.	45072.
6	260946.	36128.	2609.	14067.	1305.	1623.	55732.
7	113884.	27408.	1139.	7500.	569.	1099.	37715.
8	2170.	949.	22.	127.	11.	33.	1142.
9	201837.	35373.	2018.	12135.	1009.	1516.	52051.
10	88611.	21425.	886.	5300.	443.	842.	28897.
11	56494.	28929.	565.	4693.	282.	1034.	35504.
12	2039.	984.	20.	204.	10.	37.	1255.
13	36876.	20981.	369.	3532.	184.	752.	25818.
14	1807.	465.	18.	120.	9.	18.	630.
15	390742.	71501.	3907.	36083.	1954.	3403.	116848.
16	575813.	133744.	5758.	37389.	2879.	5393.	185164.
17	346889.	246513.	3469.	16540.	1734.	8048.	276304.
18	39917.	6650.	399.	3688.	200.	328.	11265.
19	933.	315.	9.	93.	5.	13.	435.
20	18558.	11722.	186.	1593.	93.	408.	14001.
21	1.	0.	0.	0.	0.	0.	0.
TOTAL	3402000.	883153.	30931.	189256.	17010.	33610.	1153958.

NOTE: C.E.B. TAX = CONSOLIDATION OF ECONOMIC DEVELOPMENT TAX

TABLE - 4

***** CALCULATION OF IMPORT DUTIES AND TAXES *****

YEAR: 1981

SECTION	IMPORT AMOUNT	++++++++++++++++++++++++++ TOTAL OF IMPORT DUTIES AND TAXES ++++++++++++++++++++++++++ IMPORT DUTY	STATISTICAL TAX	C.E.B. TAX	MARINE TAX	MUNICIPALITY TAX	TOTAL
1	417530.	48573.	4175.	243.	2088.	1652.	56732.
2	1145995.	128647.	6148.	56764.	5730.	5919.	203207.
3	198034.	53058.	1980.	11334.	990.	2021.	69383.
4	363391.	179834.	3634.	9121.	1817.	5832.	200238.
5	382623.	86925.	3826.	11851.	1913.	3135.	107650.
6	472067.	70925.	4721.	23374.	2360.	3041.	104422.
7	185974.	44251.	1860.	13169.	930.	1806.	62015.
8	9639.	3269.	96.	225.	48.	109.	3748.
9	280337.	47089.	2803.	16139.	1402.	2023.	69456.
10	151506.	36913.	1515.	8914.	758.	1443.	49543.
11	121713.	80254.	1217.	10342.	609.	2773.	95194.
12	2671.	1379.	27.	267.	13.	51.	1736.
13	102787.	58825.	1028.	9233.	514.	2088.	71688.
14	2367.	855.	24.	201.	12.	33.	1124.
15	498913.	117201.	4989.	46399.	2495.	5133.	176216.
16	977552.	238825.	9775.	66730.	4888.	9607.	329824.
17	757903.	461698.	7579.	32908.	3790.	15179.	521154.
18	79680.	14848.	797.	7449.	398.	705.	24196.
19	1770.	565.	18.	177.	9.	23.	792.
20	35040.	22593.	350.	3036.	175.	785.	26939.
21	5.	1.	0.	1.	0.	0.	1.
TOTAL	6187497.	1696524.	56563.	327875.	30937.	63357.	2175256.

NOTE: C.E.B. TAX = CONSOLIDATION OF ECONOMIC DEVELOPMENT TAX

TABLE - 5. Export Tariff

Code No.	Tariff Rate (LE/ton)	1978		1979		1980		1981	
		Quantity (ton)	Tariff (LE1000)	Quantity (ton)	Tariff (LE1000)	Quantity (ton)	Tariff (LE1000)	Quantity (ton)	Tariff (LE1000)
5/6	0.60	-	-	-	-	-	-	-	-
17/3	6.00	230,025	1,380	110,860	665	110,720	664	56,890	341
41/1	1.20	39	0	-	-	-	-	-	-
73/3	11.00	-	-	-	-	-	-	-	-
74/1	11.00	-	-	1	0	-	-	-	-
75/1	11.00	-	-	-	-	-	-	-	-
76/1	11.00	69,325	762	41,240	454	33,310	366	76,466	841
79/1	11.00	-	-	-	-	-	-	10	0
Total		-	2,142	-	1,119	-	1,030	-	1,182