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ESTABLISHMENT OF FURNITURE/JOINERY AND SCHOOL EXERCISE BOOK WORKSHOPS CO-OPERATION BETWEEN TURKEY AND TANZANIA

XA/URT/88/667

TANZANIA

Technical report: Appraisal of equipment availability from Turkey for exercise book production in Tanzania*

Prepared for the Government of Tanzania
by the United Nations Industrial Development Organization

Based on the work of Sinan Cinar, UNIDO expert

Backstopping Officer: Antoine V. Bassili
Industrial Management and Rehabilitation Branch

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* This document has not been edited.

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EXPLANATORY NOTES

The United Nations rate of operational exchange of the Turkish Lira (TL) to the United States Dollar (US$) for April 1989 was: TL 1994.00 = US$ 1.00.

The following abbreviations are used in this document:

C	Cycle
cu.m.	Cubic meter
ECDC	Economic Cooperation Between Developing Countries
kg	Kilogram
kW	Kulowatt
m	Meter
min.	Minute
m/min	Meter per minute
mm	Millimeter
Qty	Quantity
UNIDO	United Nations Industrial Development Organization
US	United Statesof America
V	Volt
$	United States Dollar

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INTRODUCTION

The government of Tanzania provides school exercise books to primary an secondary school students free of charge. The current estimated supply of exercise books irrespective of types and number of pages, is about 16,318,860 pieces per year. According to statistical data compiled by the Tanzanian Ministry of Education, the current shortfall in the supply of exercise books is 32,637,720 pieces per year.

In the light of the above data and in the spirit of the Solidarity Ministerial Meeting held in Arusha (Tanzania) from 23 to 26 July 1979 and the technical cooperation between developing countries (TCDC), an agreement was reached between the industry Ministers of Turkey and Tanzania for cooperation to complement the efforts of the Tanzanian Government to alleviate the shortage in the supply of exercise books.

Within the framework of its ECDC policy, UNIDO drew up a complementary project to cover the hard currency requirements to promote the above mentioned cooperation between the two countries. It is within the context of this project that UNIDO assigned Mr. Sinan Cinar as a UNIDO expert, to Ankara and Istanbul to ascertain and appraise the availability of equipment from Turkey for production of exercise books in Tanzania. His terms of reference are given in Annex I.

This report covers the findings and recommendations of Mr. Cinar during his visits to manufacturers and suppliers of exercise book production equipment from 9 to 15 April 1989 in Ankara and Istanbul. The list of persons met is given in Annex II.

The detailed analysis of present supply and shortfall and specifications of school exercise books, availability of raw materials for local production, location of the proposed workshop sites and availability and status of buildings are contained in a separate document issued by UNIDO on 17 February under document number IO/R.91. The present report complements the above document.

A list containing the names and addresses of some of the potential equipment manufacturers and suppliers in Turkey is given in Annex III.

1. FINDINGS

A. Production methods:

Option 1:

The majority of small and medium size exercise book manufacturers in Turkey are using a labor intensive method. In this method the writing paper for the pages and the cover board for covers enters in production in roll form. THHe line printing machine takes in the writing paper or the cover board from the roll, prints the lines on the

writing paper and the manufacturer's emblem and any other information on the covers, in single color, and then cuts to the required sheet sizes automatically. Rubber stereotypes are used in the printing of the lines and covers. These are separated into reams of 500 sheets. Depending on the number of pages, the adequate number of sheets together with one cover are folded by hand. Stitching of leaves and cover is done using a special steel wire on a semi-automatic machine. This produces a long book consisting of leaves and cover board having the total length of three exercise books. The crushing of the fold with a semi-automatic machine ensures continuity in the production process without waiting for the fold to set. The next operation is to cut the long book into three exercise books with a paper cutting guillotine. The final operation is to round the corners with a bench type electric shear. The production method described above is shown in Annex IV in the form of a flow chart.

Option 2:

In this method, writing paper is printed on a line printing machine as in Option 1. However, the covers of exercise books are printed on a small offset printing machine in multiple colors using offset printing plates. Folding of leaves and cover is done on an automatic folding machine. The remaining operations are the same as in Option 1 above.

8. Equipment needs:

Option 1:

The equipment needed for four workshops using the above mentioned production method as used by the majority of small to medium size exercise book manufacturers in Turkey is listed below:

No.	Equipment description	Quantity Unit	Quantity Total	Availability
1	Line and cover printing machine for reels	1	4	Local
2	Stitching machine	1	4	Local
3	Fold crushing machine	1	4	Local
4	Paper cutting guillotine	1	4	Local
5	Corner rounding shear	1	4	Local

Technical specifications, shipping volume and estimated purchase costs of the above equipment are given in Annex V.

Option 2:

The equipment needed for the production method outlined in Option 2 is listed in the following table:

No.	Equipment description	Quantity Unit	Total	Availability
	Central offset plate making unit (one unit):			
1	Vertical compact camera	1	1	Local
2	Horizontal vacuum contact printer	1	1	Local
3	Contact copy printer	1	1	Local
	Printing workshops (four units)			
1	Line printing machine	1	4	Local
2	Paper cutting guillotine	1	4	Local
3	Offset printing press	1	4	Imported
4	Folding machine	1	4	Imported
5	Stitching machine	1	4	Local
6	Corner rounding shear	1	4	Local

Technical specifications, shipping volume and estimated purchase costs of the above equipment is given in annex VI.

C. Production capacity:

Daily production capacity of a workshop operating in one shift with the equipment for the production method of Option 1 is as follows:

Daily working time: 8 hours net.
Daily printing capacity: 1,400 kgs paper in rolls
Number of exercise books: 12000-14000 pieces per day (with 24 or 46 sheets)*

The production capacity of such operations as folding, trimming, corner rounding and packing will very much depend on the availability of manual laborers and the organization of work. This inevitably will influence the overall production capacity of the workshop.

D. Manpower needs:

A workforce of 10 workers which includes skilled operators and unskilled helpers is needed for one shift operation of each workshop based on the following assumption:

Line printing machine:	2 workers
Offset printing machine:	1 worker
Folding machine	1 worker
Stitching machine	1 worker
Manual work	5 workers

* Bottleneck is in speed of folding manually, not in machine operations.

E. Training needs:

The equipment described under both options requires on the job training. This can best be done in Turkey at existing exercise book production workshops where equipment identical to the one that will be supplied are used. All the equipment manufacturers and suppliers contacted by the expert have offered such a training to Tanzanian trainees (see document IO/R.91).

F. Installation of equipment:

The installation and commissioning of equipment should be carried out by the Turkish assembly team together with the counterpart staff as outlined in document IO/R.91.

G. Equipment cost:

The unit and total equipment cost as per each option is calculated hereunder:

Option 1:

Under option 1 as proposed by the expert, the estimated total equipment cost for four exercise book production workshops on an ex-factory basis is US$ 152,000 as calculated below:

Cost per workshop:	
Production equipment:	$ 30,500
Electrical (cables, switches and switchboxes)	$ 4,000
Contingencies:	$ 3,500
TOTAL	$ 38,000

The total equipment cost of four exercise book workshops on an ex-factory basis is US$ 38,000 x 4 = US$ 152,000.

(For prices of each individual machine, see Annex V.)

Option 2:

The equipment as proposed by the UNIDO in-house printing staff member, under option 2, for one central offset plate production unit and four printing workshops, is estimated to cost, on an ex-factory basis, US$ 287,000 as calculated below:

Central offset plate production unit:

Plate production equipment:	$ 10,500
Electrical (cables, switches and switchboxes)	$ 2,500
Contingency	$ 2,000
TOTAL	$ 15,000

Cost per workshop:

Production equipment	$ 57,000
Electrical (cables, switches and switchboxes)	$ 7,000
Contingency:	$ 4,000
TOTAL	$ 68,000

Cost of four workshops:

The total equipment cost of four exercise book printing workshops under option 2 on an ex-factory basis is US$ 68,000 x 4 = US$ 272,000.

The total equipment component under option 2 is US$ 15,000 + 272,000 = US$ 287,000.

H. Shipping costs:

Shipping costs are estimated according to the available production equipment as explained under the two options described above.

Option 1:

The estimated shipping volume of one exercise book production workshop packed in seaworthy wooden crates is 21.27 cubic meters. This is about one 20 feet container which has a utilizable volume of about 27 cubic meters. Due to the fact that different sizes of wooden crates will not permit a tight filling, one 20 feet container should be allocated for each workshop.

As identified in document IO/R.91, shipping agents contacted in Istanbul are accepting container loads only to Dar es Salaam.

Based on the above information, the estimated shipping costs of four workshops, including handling and inland transport of equipment from the factories to the loading port is US$ 14,000 as calculated below:

Freight for one twenty foot container:	$ 2,800
Loading, unloading and other fees	$ 200

Total (per 20 foot container) $ 3,000

Freight for four workshops in four containers is:

US$ 3,000 x 4 = US$ 12,000

The estimated cost for inland transport of equipment from the factories to the port of Istanbul is

US$ 2,000

The estimated total shipping cost is therefore US$ 14,000.

Option 2:

The estimated total shipping volume of equipment is 79 cubic meters as calculated hereunder:

One central offset plate making unit:	11 cubic meters
Four exercise book making workshop 68 cubic meters (each workshop needs 17 cubic meters)	
Total	79 cubic meters

As in Option 1 above, different sizes of wooden crates will not permit a tight filling of containers. Therefore, four containers should be allocated also for equipment under Option 2. The total shipping cost estimate will also be US$ 14,000, as calculated under Option 1 above.

II. RECOMMENDATIONS

1. Individual machine layouts for each exercise book production workshop should be prepared by an expert prior to delivery of equipment. The services of an expert for 0.5 m/m is needed for this purpose.

2. Based on the electric power requirements of each machine and the machine layouts and points of electricity supply of each workshop, electrical wiring diagrams, bills of electrical materials such as cables, switchboxes, and other related items should be prepared by an expert, so that these can be shipped together with the equipment. The services of an expert for 0.5 m/m is needed for this purpose.

3. Based on the machine layout of each workshop, alterations and/or separations to the existing workshop buildings as may be required should be completed prior to the arrival of equipment.

4. If the printing system with rubber stereotypes is chosen, print types for covers used in Tanzania should be supplied to the printing machine manufacturer in Turkey at the time the machine is ordered so that these can be produced and delivered with the machine.

5. In view of special operating and setting skills required for the printing machines, four printing technicians (instead of two as proposed in document IO/R.91), i.e. one from each prospective workshop, should undergo on the job training for a period of three months in Turkey.

6. If a central offset plate making unit is also to be supplied, then one technician from Tanzania who will eventually operate the equipment should be trained on the job for a period of three months in Turkey in addition to the four trainees mentioned under point 5 above.

7. In view of the scarcity of available of skilled technicians in Tanzania in general, a less sophisticated and fool proof system such as option 1 should be chosen.

ANNEX I

JOB DESCRIPTION

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

31 March 1989

Project of the Government of the United Republic of Tanzania

ESTABLISHMENT OF FURNITURE/JOINERY AND SCHOOL EXCERCISE BOOKS WORKSHOPS: COOPERATION BETWEEN TURKEY AND TANZANIA

JOB DESCRIPTION

XA/URT/88/667/11-02(J-12209) Rev.1

Post title:	Printing equipment consultant.
Duration:	7 Working days.
Date required:	As soon as possible.
Duty station:	Istanbul. 3 days Ankara: 4 days
Purpose of project.:	The establishment of four furniture/joinery workshops and four exercise book workshops in Tanzania, including the training of local personnel.
Duties:	The consultant will visit leading printing equipment manufacturers in Istanbul and Ankara and obtain technical specifications, commercial information and prices for a range of machines and equipment needed by the project which are manufactured in Turkey. He will compile these and transmit his report to UNIDO, Vienna for evaluation.

..../..

Qualifications: Engineer with basic knowledge of printing technology. Knowledge of conditions of the printing industry in Tanzania and knowledge of Turkish highly desirable.

Language: English.

Background information: Under its Industrial Development Decade for Africa (IDDA) and Economic and Technial Cooperation between Developing Countries (ECDC/TCDC) programmes, UNIDO is complementing an agreement between the govenrments of Tanzania and Turkey, reached at the Solidarity Ministerial Meeting held in Arusha from 23 to 26 July 1979. In this agreement, the Turkish authorities undertook to supply the machinery and equipment for four units of school furniture manufacturing and four units of excercise books manufacturing as well as to provide training programmes for the Tanzanian trainees. The value of the eight units was then estimated at US$ 750.000. The financial modalities would consist of a soft loan in non-convertible Turkish liras made available to Tanzania to cover the cost of seven workshops. Design, engineering studies, machines, equipment and spare parts of one of the exercise book workshops will be provided by the Turkish Government on a grant basis.

The Tanzanian counterpart for the implementation of the project is the Small Industrial Development Organization (SIDO), a parastatal organization directly under the Ministry of Industry. During the past few years, SIDO has successfully built up a basic institutional framework to implement the policies of Government for development of small industries. SIDO provides various services and facilities to all types of small industries from self-employed artisans to small factories during various stages of their activities. These services may be summarized as follows: industrial estate with rural linkage, training, marketing services, raw material supply, provision of equipment and machinery, industrial consultancy.

The exercise book workshops are to be located in the Industrial Estates of Musoma, Lindi, Iringa, and Kigoma. Although several entrepreneurs have been identified, priority will be given to those already having sheds where the workshops will be installed. The proposed units will carry out production of ruled exercise books of different sizes.

At present M/S Tanzania Elimu Supplies are manufacturing exercise books and meeting only part of the requirements of educational institutions.

The total demand in schools, offices and other institutions of learning throughout the country has been estimated at around 50 million. The capacity of the proposed workshops has been estimated at 480,000 exercise books per annum, while the total requirements of the region where the units will be installed is of about 2-2.5 million. Because of the increasing educational programme like universal primary school programme, adult education campaign, the requirements of exercise books will further increase.

The water and power facilities will be provided by the local authorities. The major raw material is the unruled paper (about 24,000 reams) which will be imported. The marketing of exercise books will be done directly to Tanzania Elimu Supplies, Government stores and to regional traders. A covered area of 1000 sq. ft. is considered sufficient for the project and will be rented to sponsors by SIDO in the Industrial Estates mentioned above.

ANNEX II

LIST OF PERSONS MET

- Aybakar Machinery Industry and Trade Inc., Ankara: Mr. Ferruh Aybakar, Chairman.

- Matsan Printing Machinery Industry and Trade Co., Ankara: Mr. Mehmet Naim Guler.

- Rodoslu Co. Ltd., Ankara: Mr. Nuri Rodoslu, General Manager.

- Sir Mould and Machinery Manufacturing Co., Istanbul: Mr. Salih Aksu, Managing Director and Mr. Huseyin Arabaci, Co-partner.

- Arkadas Machinery and Chemicals Co., Istanbul: Mr. Sermet Arkadas, General Manager.

- Atasan Paper Products Manufacturing and Trade Co. Ltd., Istanbul: Mr. Ali Kuvvet, Managing Director.

- Sir Note Book and Paper Products Industry Co., Istanbul: Mr. Sami Aksu, Factory Manager.

ANNEX III

LIST OF POTENTIAL EQUIPMENT MANUFACTURERS AND SUPPLIERS

1. Rodoslu Co. Ltd.
   Mesrutiyet Caddesi No. 42
   Ankara
   Telephone: 131 27 38 - 131 27 39
   Telex: 46965 rod-TR
   Contact person: Mr. Nuri Rodoslu

2. Aybakar Makina Sanayi ve Ticaret A.S.
   Demir Sanayi
   Iznik Caddesi, Sarikoy Sokak No. 8
   Ankara
   Telephone: 341 28 90 - 341 28 91
   Fax.: 341 46 29
   Contact person: Mr. Ferruh Aybakar

3. Matsan Matbaa Sanayi ve Ticaret Koll. Sti.,
   Marmara Sokak No. 6/9
   Sihhiye, Ankara
   Telephone: 131 10 09 - 133 03 88
   Contact person: Mr. Mehmet Naim Guler

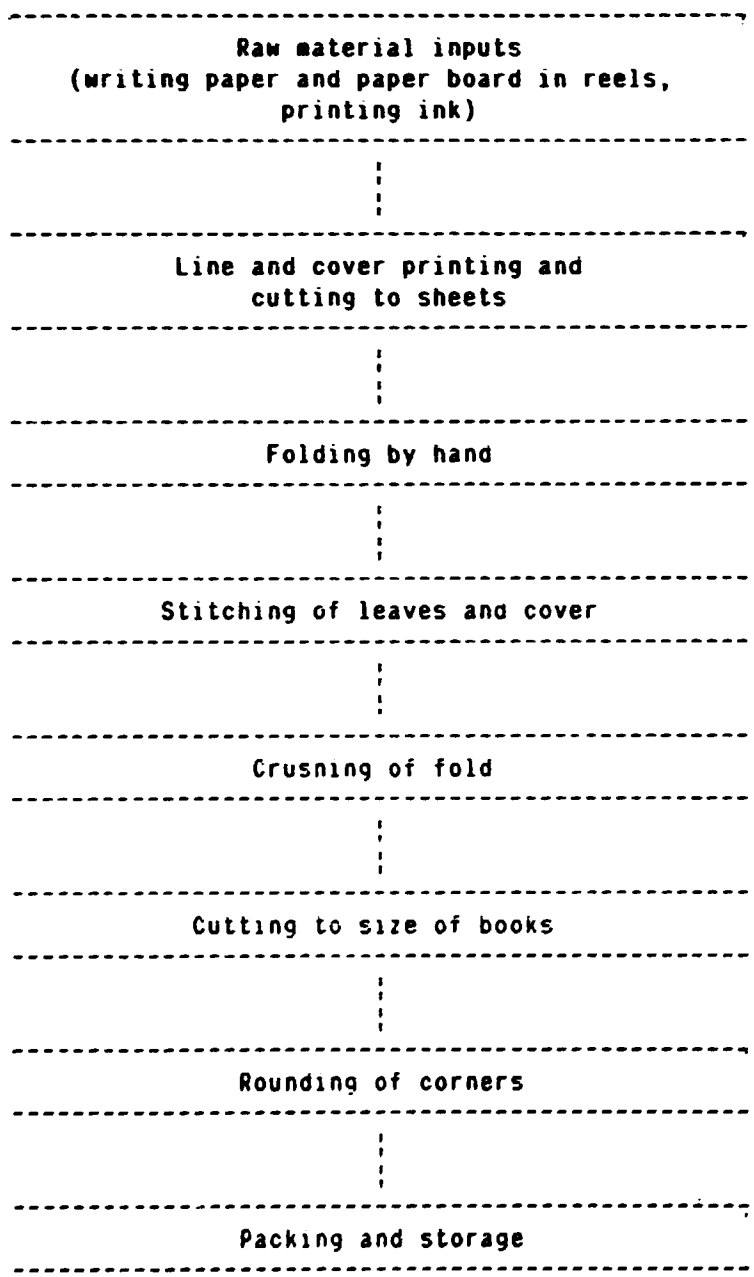
4. Arkadas Makina Kimya
   Seref Ffendi Sokak No. 26
   Cagaloglu, Istanbul
   Telephone: 528 35 78 - 528 35 79
   Telex: 23329 amk-Tr.,
   Contact person: Mr. Sermet Arkadas

5. Sir Kalip ve Makina Savayii,
   Merkez Mahallesi
   Hedef Sokak No. 9/A
   Gaziosmanpasa, Istanbul
   Telephone: 578 73 23
   Contact person: Mr. Salih Aksu

6. Matmas Matbaa Malzemeleri Ticaret ve Sanayii A. S.
   Selanik Caddesi No. 62/A-B
   Kizilay, Ankara
   Telephone 125 33 49 - 118 70 01
   Contact person: Mr. Erol Karakurt

ANNEX IV

PRODUCTION FLOW CHART FOR EXERCISE BOOKS



ANNEX V

LIST OF EXERCISE BOOK PRODUCTION EQUIPMENT
FOR EACH UNIT USING THE PRODUCTION METHOD DESCRIBED IN OPTION 1

Item No.	Description and specifications*	Qty.	Estimated cost ($)**
1	Line and cover printing machine Suitable for paper and paper board on reels Max. reel width: 800 mm Average feed rate: 60 m/min Feed speed: variable Main motor: 2 HP Auxiliary motor: 0.75 HP Assembled machine length: 6 m Assembled machine width: 1.5 m Assembled machine height: 2 m Line printing: by rubber stereotypes Cover printing: by rubber stereotypes Printing color: single. Printing capacity per shift: Uniform lined: 2 tons Square lined: 1 ton Cutting to sheets: automatic Gross weight: 3,000 kgs Shipping volume: 15 cu.m. approx.	1	20,000
2	Stitching machine Operation: semi-automatic Stitching thickness: 0 - 25 mm Stitch length: 14 mm Stitching speed: 180 stitches/minute Average capacity (with two stitches): 7500 exercise books/shift Motor power: 1/3 HP Working height: 910 mm Gross weight: 350 kgs Shipping volume: 0.07 cubic meters	1	3,000

* All the equipment should be wired for 380 volts three-phases and 50-cycles electricity unless otherwise stated and motors should be tropicalized and equipped with overload protection where applicable.

** Estimated purchase costs are ex-factory and in US Dollars. Seaworthy packing in wooden crates are included in the estimated costs where applicable.

Item No.	Description and specifications	Qty.	Estimated cost ($)
3	Fold crushing machine Operated by electric foot pedal. Crushing length: 640 mm Motor power: 1.5 HP Shipping volume: 0.9 cubic meters	1	2,000
4	Paper cutting and trimming guillotine with two finger operating system for safety Max. cutting width: 720 mm Max. cutting height: 100 mm Main motor power: 3 kW Fence motor power: 0.37 kW Gross weight: 975 kgs Shipping volume: 3.3 cubic meters	1	3,500
5	Corner rounding machine r = 25 mm Operated by electric foot pedal Motor power: 0.1 HP Gross weight: 75 kgs Shipping volume: 1 cubic meter	1	2,000

ANNEX VI

LIST OF EXERCISE BOOK PRODUCTION EQUIPMENT FOR ONE UNIT
AS PER OPTION 2

Item No.	Description and specifications*	Qty.	Estimated cost ($)**
	A. Central offset plate making unit:		
1	Vertical compact camera Max. film size: 510 x 610 mm Max. original size: reflection: 720 x 530 mm transparency: 550 x 450 mm 4 Flash lamps Lighting equipment reflection: halogen lamps (220 V 4x500 W) transparency: fluorescent lamps (6x20 W) Lens: f = 150 mm Enlargement capacity 50-500% f = 240 mm Enlargement capacity 50-200% Electricity requirements: 220 V (Single phase) Gross weight: 210 kgs Shipping volume: 5.4 cubic meters	1	4,500
2	Horizontal vacuum contact printer Max. printing size: 850 x 1,050 mm Light source: 5000 W, metal halide Vacuum pump: 1/4 HP (220 V.) Electricity: 380 V 50 C No. of channels: 9 Gross weight: 270 kgs Shipping volume: 4.3 cubic meters	1	4,000
3	Contact copy printing cabinet Max. film size: 520 x 720 mm Electricity: 220/380 V 50 C. Power of vacuum pump: 1/4 HP Gross weight: 70 kgs Shipping volume: 0.88 cubic meters	1	2,000

* All the equipment should be wired for 380 volts three-phases and 5- cycles electricity unless otherwise stated and motors should be tropicalized and equipped with overload protection where applicable.

** Estimated purchase costs are ex-factory and in US Dollars. Seaworthy packing in wooden crates are included in the estimated costs where applicable.

Item No.	Description and specifications	Qty.	Estimated cost ($)
	B. Exercise book printing workshop:		
1	Small offset printing machine Maximum printing area: 260 x 420 mm Gross weight: 750 kgs Shipping volume: 2.1 cubic meters	2	37,000
2	Paper cutting and trimming guillotine with two fingers operating system for safety Max. cutting width: 720 mm Max. cutting height: 100 mm Main motor power: 3 kW Fence motor power: 0.37 kW Gross weight: 975 kgs Shipping volume: 3.3 cubic meters	1	3,500
3	Stitching machine Operation: semi-automatic Stitching thickness 0-25 mm Stitch length: 14 mm Stitching speed: 180 stitches per minute Average capacity: 7500 exercise books with two stitches per shift Motor power: 1/3 HP Working height: 910 mm Gross weight: 350 kgs Shipping volume: 1.07 cubic meters	1	3,000
4	Folding machine No. of folding stations: 1 Estimated shipping volume 3 cubic meters	1	10,000
5	Line printing machine (for specifications, see item 1 in Annex V) Gross weight: 1,650 kgs Shipping volume: 6 cubic meters	1	20,000
6	Corner rounding machine r = 25 mm Motor power: 0,1 HP Operated by electric foot pedal. Gross weight: 756 kgs Shipping volume: 1 cubic meter	1	2,000