[The Purchaser shall fill in this table (Columns A to G inclusi

Line Item N°	Description of Goods	Quantity	Physical unit	F
A	*B*	*C*	*D*	
1	**Supplying Advanced modern high voltage coil winding machine for winding high voltage coils for power transformers and origin from Japan or west country**	**1**	**Unit**	a C V (
2	**Supplying Advanced modern low voltage coil winding machine for winding low voltage coils for power transformers and origin from Japan or west country**	**1**	**Unit**	a C V (

Subject/ Supplying modern low voltage coil winding machine used for winding low voltage coils for power Transformers with capacities from(16 MVA)to(63 MVA) according to details as in the attached table, now there is a winding machine in our factory as following :

1- The technical specifications for the existing machine:-

Horizontal type

Capacity	
Coil height	(1800) mm Max.
Revolution	(8) r.p.m app.
Output torque	144 kg -m max.
Supporting weight	1250kg
Span between mandrel bearings	Variable between (1200 and 2300) mm
Applicable coil radius	800 mm max.
Power source	AC (380 ± 10%) V and (50± 1%) Hz, 3Ø

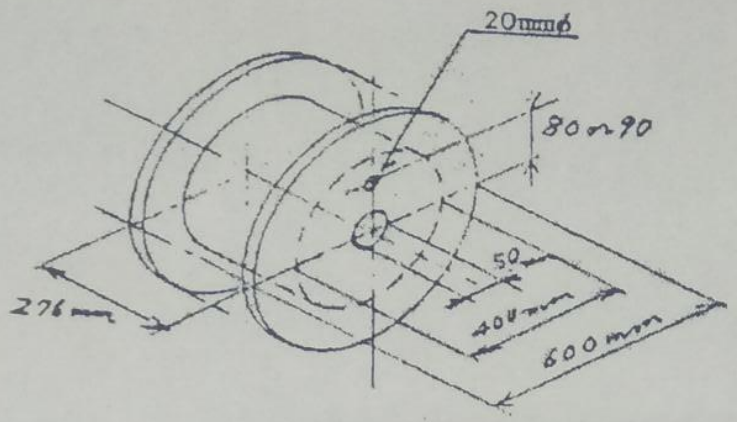
Powder brake & clutch
Speed reducer : to change the out put of motor for proper revolution & torque

2-The technical specifications for fixtures of machine:-

- Number of drums loaded	36 drums = 2levels x3x6 rows
- Total load	7200kg max. (200kg x 36)

NOTE:-The feeding of the raw material (copper wire) from the holder of pulleys above to the machine i thirty six wire ,and the fixtures capable of moving the vehicle to the left and right to maintain straightening of the wires. Attachment the technical specification for the wires

(R166/B , R170/A, R172/A, R176/A, R213/A, R215/A)



Applicable conductor drum

-Greatest outer dia.	600mm
-winding shaft dia.	400 mm
-Diameter of hole provided for shaft	50mm
-Width	276mm

-Torque transmission pin hole provide a hole 20mm in dia. at appoint (80 ~ 90) mm from drum center.

Weight 200kg max. (Including weight of conductor).

3. Supply the following:

Set of expanding mandrel for all types of coils and various capacities transformers, according to the attached table which shows all the measurements and details of available expanding mandrel we have with the current machine in the factory, and the annex details of the form of a coil for high voltage (H. V TAP) for (63 MVA) transformer capacity in the Attached drawings numbered (HTA9439, HTX0740, HTU9545, HTR7582, and HTX0741) with taking into consideration the possibility of winding more than coil type on a single expanding mandrel, if possible.

4. - Supply the following spare parts:

- PLCs (2) set.
- A.C. drives (2) set.
- All valves which exist in the machine (one) pcs. For each type, in case of existing similar valves, it would be (three) pcs.
- All existing electronicall cards in the machine (one) pce. For each type, in case of existing similar cards, it would be (three) pcs.
- All existing sensors types in the machine (one) pce. For each type, in case of existing similar sensors, it would be (three) pcs.

  Providing all requirements related to operation, regulation and maintenance Of the machine.
- The control cabin must be cooled to save the temperature of the internal parts of the board (electronic cards).
- Supplying the electrical unit inside the board with a voltage regulator to protect it against sudden voltage drop and frequent interruptions, as well, supplying UPS unit to preserve information and programs during power failure.

Subject: supply advanced and modern for high voltage coils winding machine for different kinds of transformers with various capacities power transformers according to the following specifications:

1st. Dimensions of coils manufactured by the machine:

- Coil inner diameter: (Ø 505 ~ Ø 1436) mm.
- Coil outer diameter: (Ø 625 ~ Ø 1464) mm.
- Coil weight: (350 ~ 2600) kg.
- Coil height: (436 ~ 2000) mm.

2nd. Technical specification of copper wire used for coils manufactured by the machine:

Rectangular copper wires(DIN 46434) insulated by many layers of creep paper (0.076 mm thickness for each layer) used for coil production, as attached its codes No.:-
(R163/A, R164/A, R166/A ~ R169/A, R171/A, R171/B, R173/A ~ R175/A, R177/A, R210/A ~ R212/A, R214/A, R216/C, R216/D).

3rd. Technical specification for the machine:

- Power supply: AC 3Ø 380V ± 10% , 50HZ ± 1.
- Horizontal type.
- Compressor Air Supply: 5 bar Max.
- Humidity: 95 %
- Environmental temperature: 55°C Max.
- Revolution: 8 r.p.m Max.
- Output torque: 420 kg.m Max.
- Two directional Revolution motor

Speed reducer to change the output of motor for proper revolution & torque.

4th . Technical specification for tension constructions:-

- Number of drums loaded: 4 drums.
- Static load: 800 kg Max. (200kg x 4)
- Transverses shift range: 3500 mm.
- Tension generation capacity:

  Generable maximum tension: 150 kg (per conductor).

  (conductor winding diameter on drum is 600 mm).

  Tension limitation during drum rotation 30kg (per conductor).

  (conductor winding diameter on drum is 600 mm).

- Brake: 4 x 10 kg.m
- Power source: AC (380 ± 10 %) V and (50± 1%) Hz,3Ø
- Applicable conductors drum

  greatest outer dia. 600mm.

  winding shaft dia. 400mm.

  diameter of hole provided for shaft 50mm.

  Width 276mm.

  Torque- transmission pin hole provide a hole 20mm in dia. at

  Appoint (80~90) mm from drum center.

-Weight: 200kg Max.(including weight of conductor).

Note:-The feeding of raw material (copper wire), from the rolls holder above to the machine in 4 parallel rows ,the rolls holder contain control penal fixed near the winding machine to move the tension constructions left and right to keep copper wires strait during machine operation and dimensions of drum & tension constructions are explained in Fig(1) & Fig(2) below.

5th. Provide us (4) mandrels to wind coils as shown in the following table.

Mandrel	Length [mm]	Inner Diameter [mm]	Outer Diameter [mm]
Mandrel (No.1)	733 ~ 886	505 ~ 581	625 ~ 695
Mandrel (No.2)	1044 ~ 1284	672 ~ 791	816 ~ 950
Mandrel (No.3)	1579 ~ 1664	1058 ~ 1155	1241 ~ 1346
Mandrel (No.4)	435 ~ 449	1331 ~ 1436	1359 ~ 1464

6th. The following accessories should be provided with the machine:-
- multi – wire guiding system
-Insulation feeding device
-Pressing device
-Extension of center width
-CNC control system

7th. Supplying the following spear parts:-

- PLCs (2)set (the set means all electronic related cards existing with the mean unit for the PLC) .The PLC should be programmable.
- All valves which exist in the machine (one) pce. for each type, in case of existing similar valves, it would be (three) pcs.
- All existing electronic cards in the machine (one) pce. for each type, in case of existing similar cards, it would be (three) pcs..
- All existing sensors types in the machine (one) pce. for each type, in case of existing similar sensors, it would be (three) pcs.
- Providing all requirements related to operation, regulation and maintenance of the machine.

8th. Providing our company with the detailed catalogues related to operation and maintenance, which should contain all electrical, electronic and mechanical and operation programming related to maintenance and operation data in the form of printed documents as well as compact disks CD in 4 copies in English language.

9th. Providing us with operating programs(software)of the machine(in case of the supplied machine is CNC machine) &programs of diagnosis of defects and related programs, in addition to all the accessories & parts required, to loading the above programs (software) & also programs for PLCs unit.

-The control cabin must be cooled to save the temperature of the internal parts of the board (electronic cards).

-Supplying the electrical unit inside the board with a voltage regulator to protect it against sudden voltage drop and frequent interruptions, as well, supplying UPS unit to preserve information and programs during power failure.

10th. Providing spare parts sufficient for two years including all main electronic, electrical and mechanical parts which exposed to wear & corrosior and, a well as, above spare parts in item(7th.).

11th. Provide us detailed list of spare parts for machine with its prices to b selected by us.

12th. Training a staff of engineers and technicians from our company at the Manufacturer company of machine on maintenance & operation.

13th. Installation and experimental operation will be with the following options

a. The responsibility of installation and experimental operation should be on the supplying company with all requirements for installation and experimental operation.

Or

b. The Supplier company must train technical staff from Diala company about installation and experimental operation in the manufacturing company and taking up& supervision by hot-online with all requirements until completing the installation and experimental operation in Diala Company.

14th. Supplier company should supply the raw material necessary for trainin experimental operation.

15th. Supplier Company should provide hot line for contact between Diala company and the manufacturer company, for discuss any technical trouble during the operation of the machine.

16th. Warranty period should be for one year starting from the date of operati

17th. The supplied machine manufactured in companies preferably obtained ISO Standardization, and origin from Japan or any west country.

18th. For further technical information, please visit our company website:

Code No.	R163/A~ R176/A , R165/B , R166/B ,R171/B, R210/A ~ R213/A	Sheet : 1 Sheets : 4
Material Name	Single Rectangular Paper Insul. Copper Wire	

Specifications: MIM 310-B06-024

To be used in oil immersed power transformers for coil winding.

1-Specifications of conductor :-

Tensile strength Kg f/ mm^2	Elongation %	Conductivity
26 max.	34 min.	100% min.

2- Specifications of insulating paper :-

- 100% Kraft pulp of density 0.6 ~ 0.85 g/cm^3 .
- Thickness : $0.076^{+0.004}_{-0.007}$
- Moisture : 10.0 % max.
- Ash contents : 1.0% max.

Tensile strength Kg/mm^2		Elongation %		Dielectric breakdown strength KV/mm		Heated deterioration %
Longitudinal direction	Transversal direction	Longitudinal direction	Transversal direction	Average	Minimum.	
4.5 min.	1.5 min.	2.0 min.	3.0 min.	5.5 min.	4.0	5.0 max.

3- Paper width = $\dfrac{\text{Circumference of conductor (incl. paper thickness)}}{\sqrt{2}}$

Each tape of insul. paper by itself must be wrapped by butt joint (Gaps 0 to 1.0mm) These layers , one over the other must form a half overlap , with limits up to (1/4 ~ 3/4) of tape width.

Wrapping angle = 45° ± 10°

Tolerances of finished insulation thickness + 4.5%, -10%

Equivalent standard

Conductor : JIS C3104 Class 2 (Annealed) or DIN 46434 ECu58-F20.

Insulating paper : JIS C2304 Class 2. or DIN 6740

5. Providing detailed price list of spare parts required for machine and its accessories which will be chosen by our company.

6. Providing us with the detailed catalogues includes all technical documents of machine related to technology process and the detailed catalogues includes all electronical, electrical and mechanical information, as well as the operational programming (soft ware) concerning with maintenance and operation in form of printed documents and compact disks CD, in three copies in English language.

7. Training a staff of engineers from our company at the manufacturer company of machine on maintenance & operation.

8. Installation and experimental operation will be with the following options: -

a. The responsibility of installation and experimental operation should be on the supplying company with all requirements for installation and experimental Operation.

b. The supplying company must train technical staff from diala company about Installation and & supervision by hot-online experimental operation in the manufacturing company and taking up with all requirements until completing the installation and experimental operation in diala company.

9- The supplying company should be preparing hot-online between diala and manufacturing company for discussing any problem appear during operation.

10. Warranty period of one year starting from the date of operation of machine.

11. The supplied machine should be manufactured in companies obtained ISO standardization. and origin from Japan or any west country

12. For further information, please visit our company website:

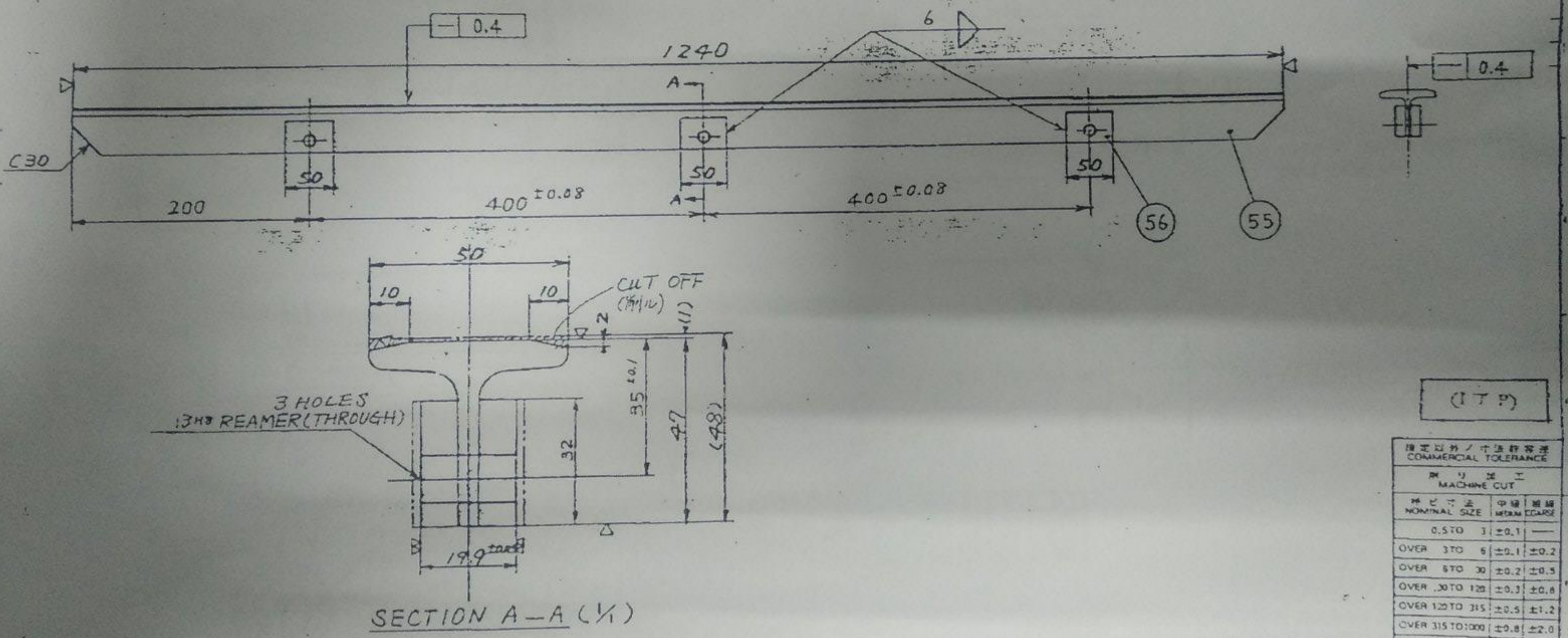
Attachments
-Table.
-Drawings (5).
-Raw material specifications(2).

TABLE FOR EXPANDING MANDREL(L.V)

Transformer capacity	16MVA	31.5MVA	63MVA	63MVA
Coil type	L.V	L.V	L.V	REACTOR
Inner diameter of coil mm	479	580	723	300
Length of mandrel mm	1995	2185	2575	1995
Length of shoe mm	1560	1700	2120	1560
NO. of shoes	16	18	24	24

DWG NO. HTU9525

GROUP No.	ITEM	DESCRIPTION	MATERIAL	REQD.	STD.	STOCK	REF. DWG. No.	REMARKS
(1)	55	SHOE	SS41 H 100×50×5-1240					
(1)	56	00	SS41P9-32×50					



(ITP)

COMMERCIAL TOLERANCE		
MACHINE CUT		
NOMINAL SIZE	MEDIUM	COARSE
0.5 TO 3	±0.1	—
OVER 3 TO 6	±0.1	±0.2
OVER 6 TO 30	±0.2	±0.5
OVER 30 TO 120	±0.3	±0.8
OVER 120 TO 315	±0.5	±1.2
OVER 315 TO 1000	±0.8	±2.0
OVER 1000 TO 2000	±1.2	±3.0
OVER 2000 TO 4000	±1.8	±4.5

(組) HTA9439

1/0 (6)

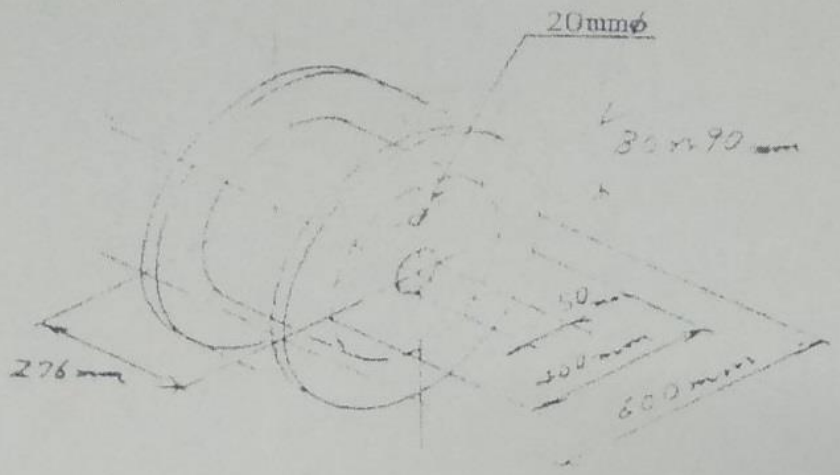
DUP DIST. AM 1023

TITLE SHOE

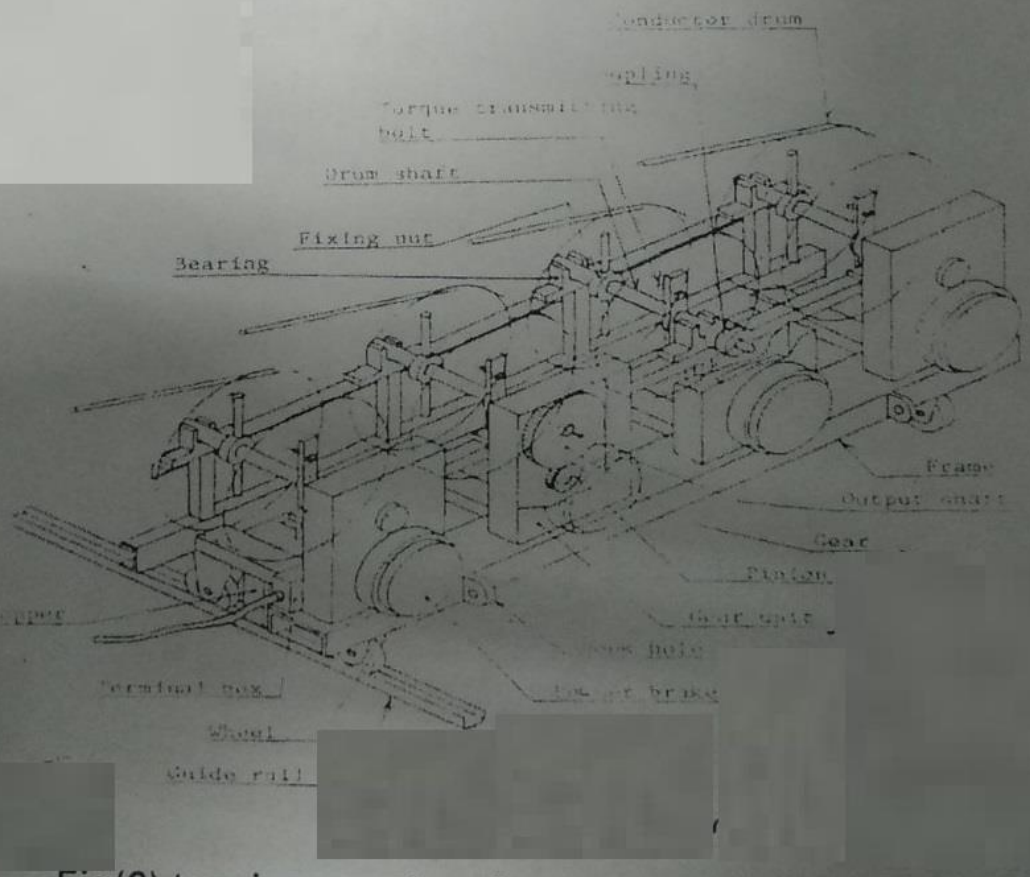
9

7 8 9 10 11

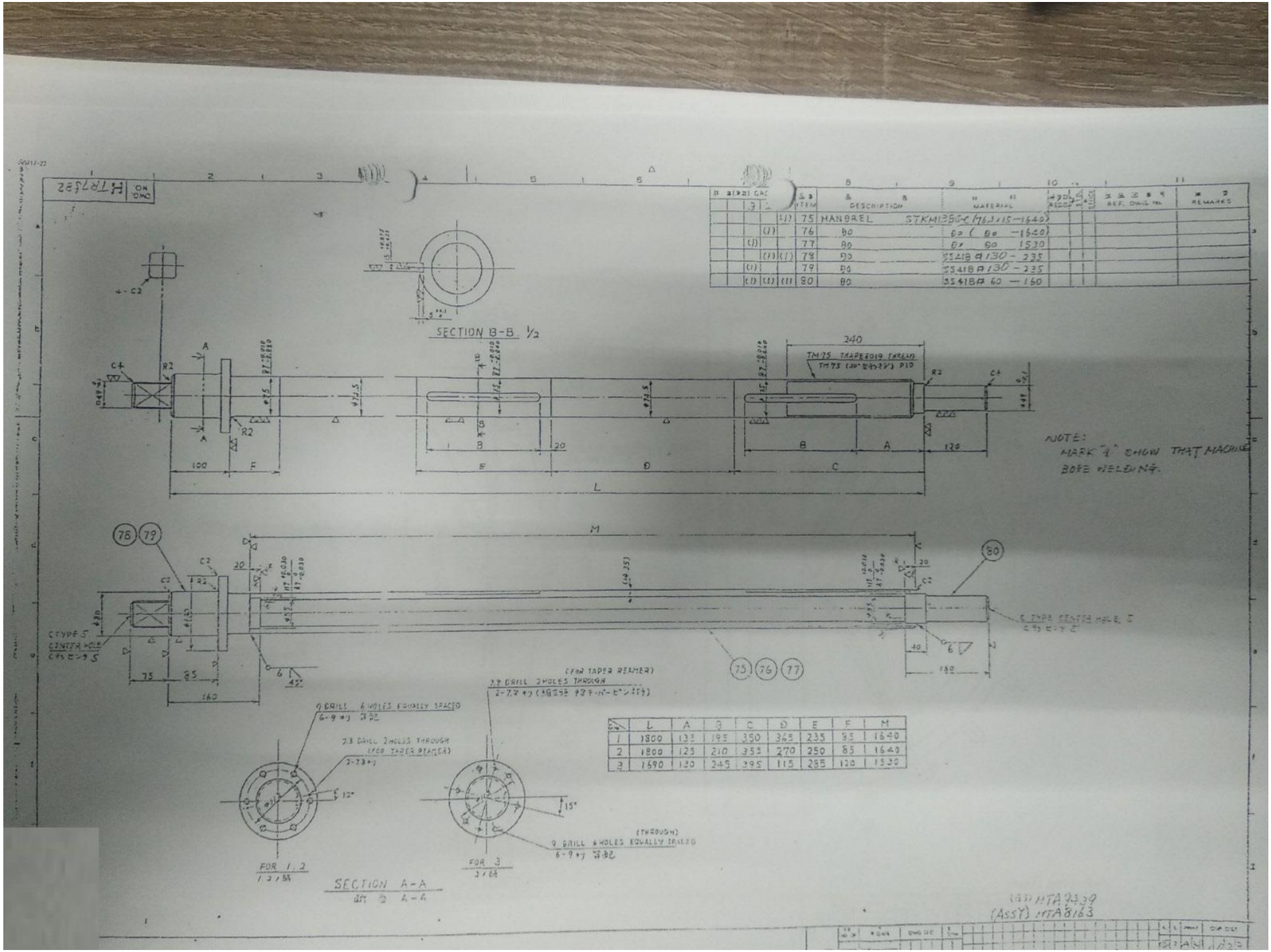
GROUP No. 1	ITEM	DESCRIPTION	MATERIAL	REQD	STD	STOCK	REF. DWG No.	REMARKS
1	1	NUT	SS41B φ 130-80				HTU 3915-61	
2	2	DO	SS41P 16-65×90				DO -61	
1	5	COUPLING	SS41B φ(170-56)				HTV 1330-41	
6	6	SOCKET BOLT M8×35			△	O		
1	7	RING	SS41B φ 150-26				HTV 1331-41	
6	8	SOCKET BOLT M8×30			△	O		
1	10	THRUST PLATE	C2801P-1/2H 23-919				HTW 3745-61	
1	11	SPRING PIN 3×25			△	O		
144	15	PIN	SK5 [illegible] 13-56				HTW 3746-61	
288	16	WASHER M8			△	O		
288	17	U-NUT M8			△	O		
2	20	TAPER PIN φ8×40	JIS B 1352 class 2 S20C				[illegible] HTW 3747-61	
144	25	LINK	SS41B □(38×12-286)				HTW 3755-61	
72	26	DO	SS41B □ (19-120)				DO -61	
24	55	SHOE	SS41H (100×50×5-1290)				HTU 9545-61	
144	56	DO	SS41P 9-32×50				DO -61	
1	63	SPACER PIPE	SGP-B 28-284				HTU 3920-62	
2	64	DO	SS41P 12-φ130				DO -62	
12	74	SOCKET BOLT M8×20			△	O		
6	81	SOCKET BOLT M8×25			△	O		
1	77	MANDREL	STKM13B-S-C(763×15-1530)				HTR 7582-63	
1	79	DO.	SS41B φ 130-235				DO -63	
1	80	DO	SS41B φ 60 160				DO -63	
1	145	CENTER RING	SS41B φ 130-110				HTX 0741-61	
1	146	DO	DO DO				DO -62	
1	147	DO	DO DO				DO -63	
6	148	DO	SS41P 23-φ1040				DO -61, 62, 63	
18	149	DO	SS41P 22-130×380				DO -61, 62, 63	
9	150	DO	SS41P 45-179×241				DO -61, 62, 63	
18	151	DO	SS41P 45-98×426				DO -61, 62, 63	
1	156	SOCKET BOLT M6×12			△	O		
1	157	WASHER M6			△	O		
2	159	PARALLEL KEY 15×10×110 ([illegible])					BUY 02727 ([illegible])(SEIF: SHRTO)	



Fig(1) wooden drum.

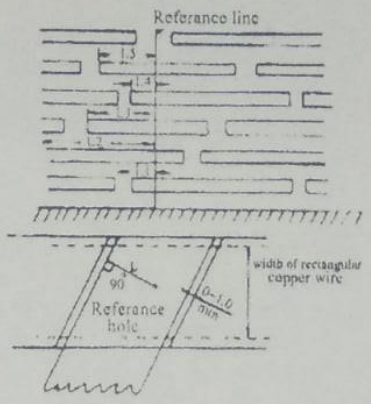


Fig(2) tension constructions for wooden drum.



ITEM	DESCRIPTION	MATERIAL	REMARKS
75	MAINSHAFT	STKM13B-C (φ63.15-1640)	
76	〃	〃 (〃 -1640)	
77	〃	〃 〃 1530	
78	〃	S541B φ130 - 235	
79	〃	S541B φ130 - 235	
80	〃	S541B φ60 - 160	

NO.	L	A	B	C	D	E	F	M
1	1800	135	195	350	365	235	85	1640
2	1800	125	210	355	270	250	85	1640
3	1690	130	245	395	115	285	120	1530

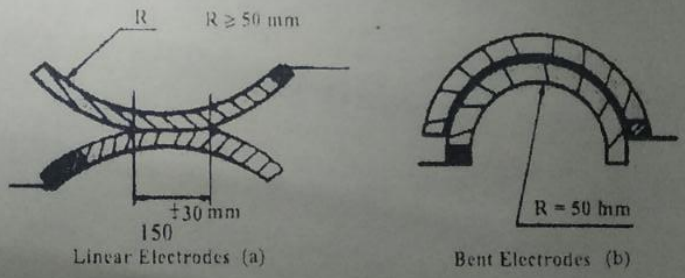


4- Test and inspection :

4.1- Bending strength : There must not be any breakages or tears in any layer when bent 90° around a circular bar of dia. = 50mm. Bending deformation shall be caused in the center of 1 m long sample of wire.

4.2- Dielectric breakdown voltage test :-A sample of 2m length, is to be divided into 3 pieces and regarded as one lot. Heat the sample up to 100~110 °C and keep it continuously at that temp. for 3~ 5 Hrs . Then immediately immerse in mineral oil for transformers (Spec. BS 148-72 or JIS C 2320 No.2) minimum.

a) Shape of electrodes :- Each 2 pieces of 250 mm length are regarded as one set . Two types of electrodes should be used : (a) Linear opposite electrodes and (b) bent opp. electrodes , as shown below:-



b) Application of voltage: - The test should be carried out with the sample sets immersed in the insulating oil.

Apply voltage of commercial frequency with crest factor of 1.34 ~ 1.48 between the electrodes.

Raise the voltage uniformly from 0v until it reaches the minimum breakdown voltage in 10 seconds as specified in the below table , and measure the breakdown voltage.

No. of paper layers	KV/Layer	
	Mean value	Minimum value
2 ~ 5	3	1
6 ~12	2	0.5

c) The dielectric breakdown test should be carried out on 3 lots and the mean value shall be obtained as test results.

Code No.	R163/A~ R176/A , R165/B , R166/B,R171/B, R210/A ~ R213/A	Sheet : 3
		Sheets : 4

5- Dimensions and lengths:-

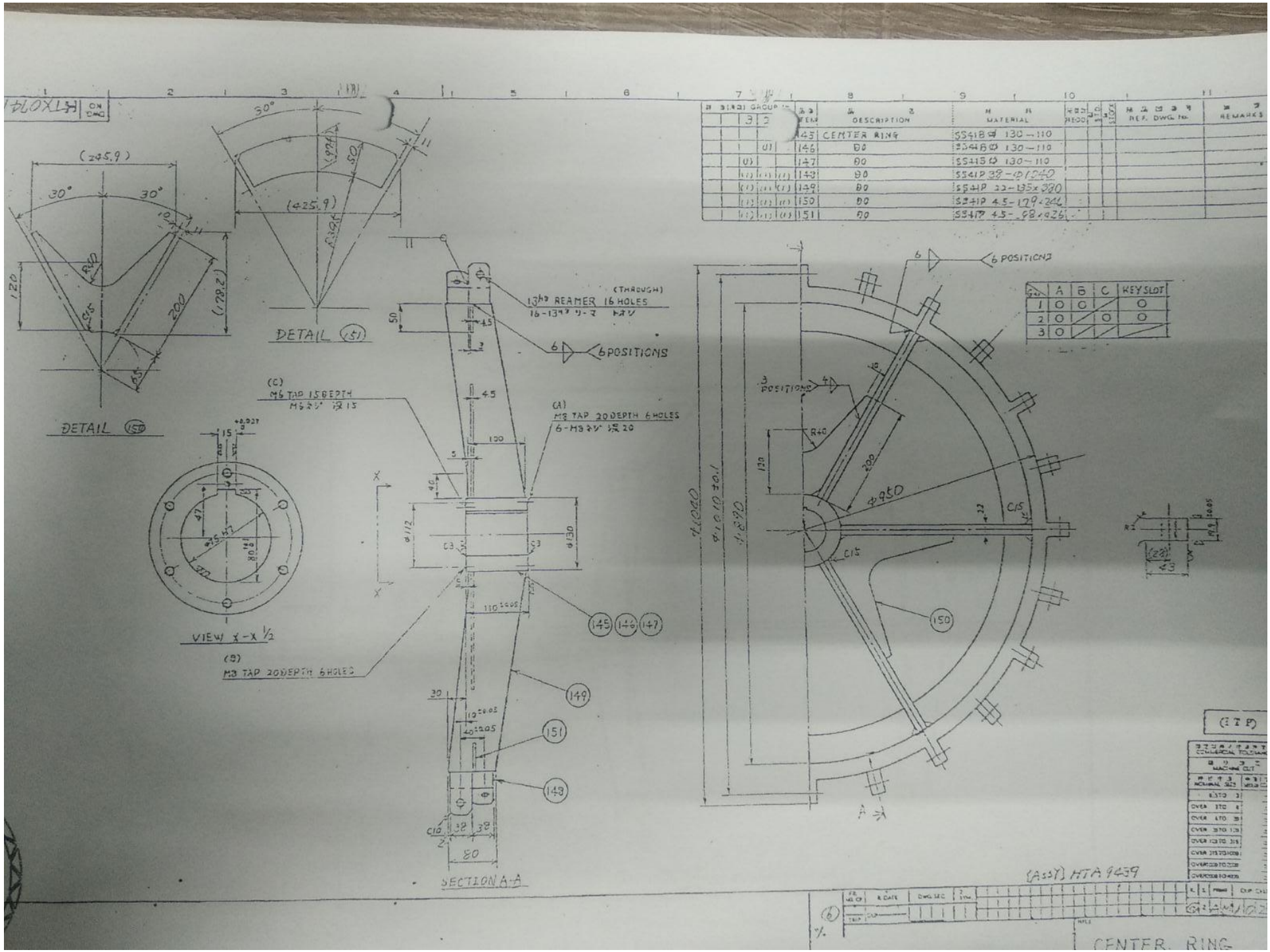
Code No.	Dimensions mm	Insulation		Meter/spool	Kg/ spool (*1) (*2)
		Thickness mm	No. of layers		
R163/A	$2.0^{+0.05} \times 9.5^{+0.1}$	0.61	4	745.6 ~ 749.6	130 ~130.7
R164/A	$2.4^{+0.05} \times 8.0^{+0.1}$	0.61	4	748.8 ~ 750	132 ~ 132.2
R165/A	$2.8^{+0.07} \times 10.0^{-0.15}$	0.61	4	281 ~ 283.3	72 ~ 72.6
R165/B	$2.8^{+0.07} \times 10.0^{+0.15}$	0.61	4	238.2 ~ 240.8	63 ~ 63.7
R166/A	$3.2^{+0.07} \times 11.0^{+0.15}$	0.61	4	368 ~ 369.5	119 ~ 119.5
R166/B	$3.2^{+0.07} \times 11.0^{+0.15}$	0.61	4	382.6 ~ 384.1	124 ~ 124.5
R167/A	$3.2^{+0.07} \times 10.0^{+0.15}$	0.61	4	255.3 ~ 257.0	75 ~ 75.5
R168/A	$3.0^{+0.07} \times 10.0^{+0.15}$	0.61	4	570.2 ~ 572.0	157~ 157.5
R169/A	$3.0^{+0.07} \times 10.0^{+0.15}$	0.76	5	541.2 ~ 543.0	149 ~ 149.5
R170/A	$3.5^{+0.07} \times 9.5^{+0.1}$	0.61	4	215.7 ~ 218.3	66 ~ 66.8
R171/A	$3.0^{+0.07} \times 10.0^{+0.15}$	0.61	4	489.8 ~ 491.6	135 ~ 135.5
R171/B	$3.0^{+0.07} \times 10.0^{+0.15}$	0.61	4	486.9 ~ 488	134 ~ 134.3
R172/A	$3.5^{+0.07} \times 4.5^{+0.07}$	0.46	3	536.5 ~ 538.6	76 ~ 76.3
R173/A	$3.5^{+0.07} \times 11.0^{+0.15}$	1.07	7	375.8 ~ 377.5	133 ~ 133.6
R174/A	$2.6^{+0.07} \times 10.0^{+0.15}$	1.07	7	551.4	131
R175/A	$2.6^{+0.07} \times 10.0^{+0.15}$	1.52	10	320.2 ~ 322.3	76 ~ 76.5
R176/A	$3.5^{+0.07} \times 10.0^{+0.15}$	0.61	4	174 ~ 174.4	56 ~ 56.1
R210/A	$3.5^{+0.07} \times 11.0^{+0.15}$	1.07	7	276 ~ 276.6	93 ~ 93.2
R211/A	$2.6^{+0.07} \times 10.0^{+0.15}$	1.07	7	469 ~ 471.7	106~ 106.6
R212/A	$2.6^{+0.07} \times 10.0^{+0.15}$	1.52	10	477.8 ~ 478.3	108 ~ 108.1
R213/A	$3.0^{+0.07} \times 6.0^{+0.07}$	0.61	4	670.9 ~ 671.6	104 ~ 104.1

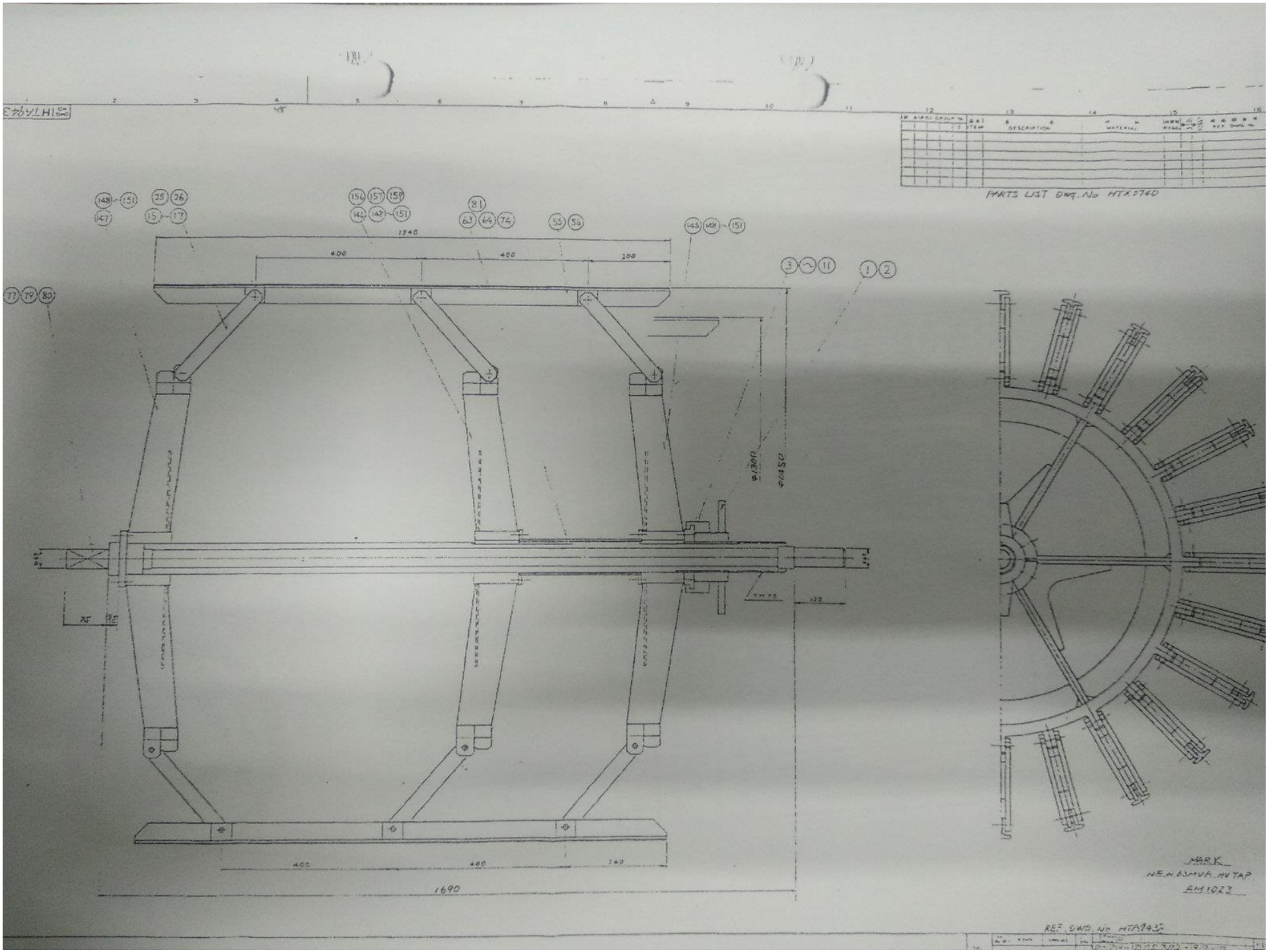
(*1) Kg/Spool= weight of copper + weight of ins.

(*2) Any additional weight out of the fixed values in the table will be neglected during supply.

TABLE FOR EXPANDING MANDREL(HV+MV)

Transformer capacity	16MVA	31.5MVA	63MVA			
Coil type	H.V	H.V	H.V	H.V TAP	MV	MV TAP
Inner diameter of coil mm	653	775	1125	1413	912	826
Length of mandrel mm	2185	2185	2575	1885	2575	2575
Length of shoe mm	1700	1700	2120	1240	2120	2120
NO. of shoes	16	18	24	24	24	24


DETAIL (151)
DETAIL (150)
VIEW X-X 1/2
SECTION A-A
13H9 REAMER 16 HOLES (THROUGH)
6 POSITIONS
(A) M8 TAP 20 DEPTH 6 HOLES
(B) M8 TAP 20 DEPTH 6 HOLES
(C) M6 TAP 15 DEPTH
3 POSITIONS
KEY SLOT
CENTER RING


PARTS LIST DWG. No HTX276D
1240
400
400
300
1690
405
400
140
MARK
NEW ASHVA HYTAP
AM1027
REF. DWG. NO HTA943