Design of Cross-Flow Turbine BYS/T3

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Published by:
Swiss Center for Appropriate Technology
Varnbuelstrasse 14
CH-9000 St. Gallen
Switzerland

Paper copies are $10.00.

Available from:
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CROSSFLOW TURBINE

type: BYSIT3

- with manually operated flow regulator
- Rotor diameter : 200 mm
- Nozzle width : 50 to 920 mm

Flow: $Q = Q_s \cdot b_o \cdot \sqrt{H_n}$

where: Q_s = spec. discharge = 0.15 l/s.

b_o = nozzle width (mm)

H_n = net head (m)

Rated speed: $N = n_s \cdot \sqrt{H_n}$

n_s = 197

⇒ H_n = 5.2 m Q = 300 l/s.

Nozzle width: $b_o = \frac{300}{0.15 \cdot \sqrt{5.2}} = 877$ mm

- b_o = 920 mm (standard size)
- $N = 197 \cdot \sqrt{5.2}$ = 450 RPM
- $P = \frac{200 \cdot 5.2}{102} \cdot 0.7$ = 10 kW

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CF Turbine: BYS /T3

Hints for the use of the drawing set:

- Drawings are divided into sub-assembly and assembly groups. The corresponding parts-list bears the same number code as the assembly drawing.
- In addition, the whole set is numbered serially starting with S 01 and upto S 75.
- Manufacturing instructions of difficult parts and the assembly procedure are shown on the pages preceeding the workshop drawings.
- Code "b_0" refers to the variable nozzle width. All drawings with b_0-related measurements have to be completed by adding the chosen b_0. Example: b_0 = 920 as calculated. For drawing 01/00 : b_0 + 70 = 920 + 70 = 990 mm; b_0 + 130 = 920 + 130 = 1050 mm.
- On drawings where the number of holes is variable due to variable width, the correct center to center distances are to be found in the respective row of b_0. Example: Drwg. 03/05: Measurements A to L read from row b_0 920 → A, B, K, L = 86 mm. C, D, E, F, G, H, I, J = 87.
- Depending on the head under which the turbine is to operate and on the rotor width, the rotor requires one or several supporting disks. One of the drawings S 29 to S 33 is to be used accordingly for the fabrication of the respective rotor.

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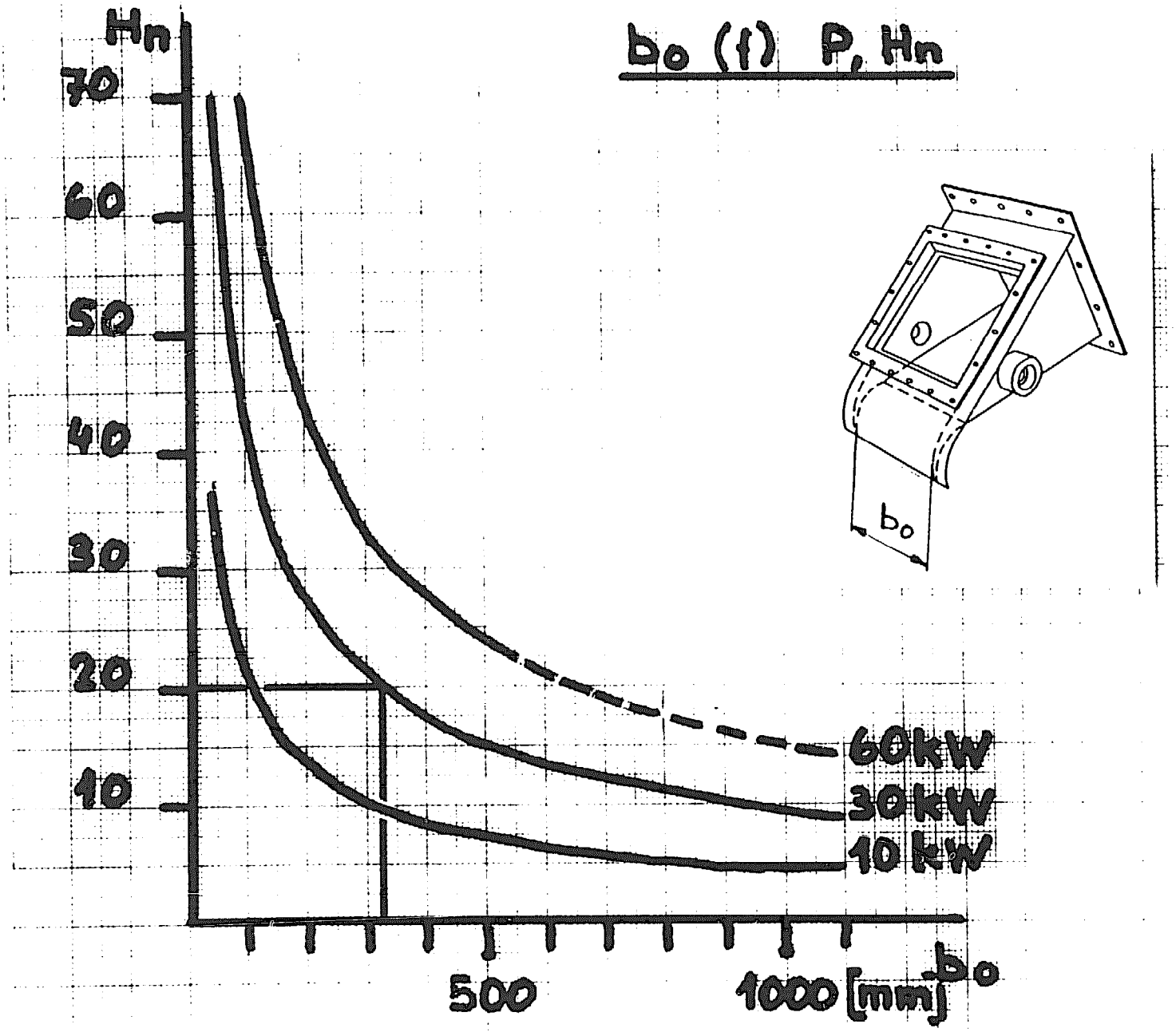
b_o (f) P, H_n



Turbine T3:

$$b_o = \frac{102\,P}{\eta \cdot H_n\, Q_s \sqrt{H_n}}$$

$$b_o = \frac{971.4\,P}{H_n \cdot \sqrt{H_n}}$$

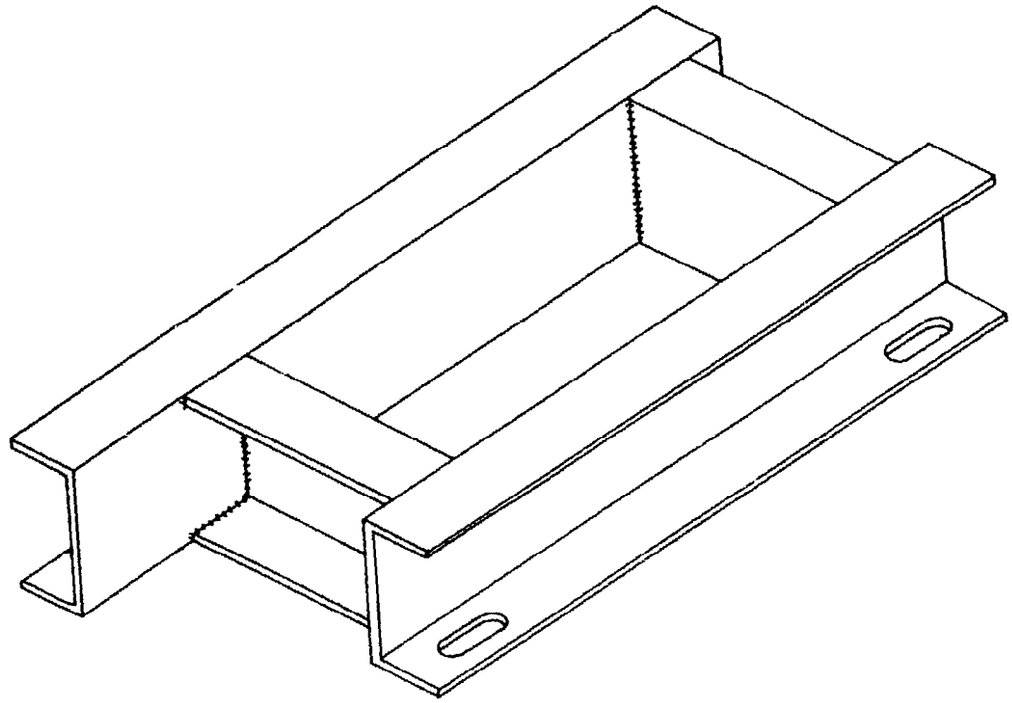
with: $\eta = 0.7$

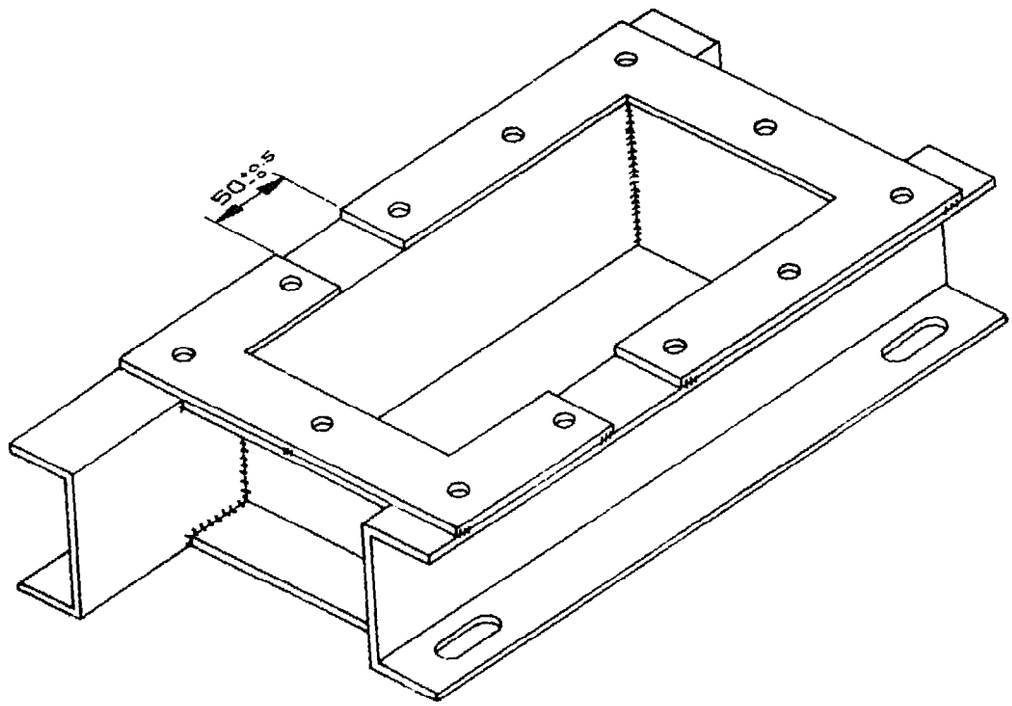
$Q_s = 0.15$

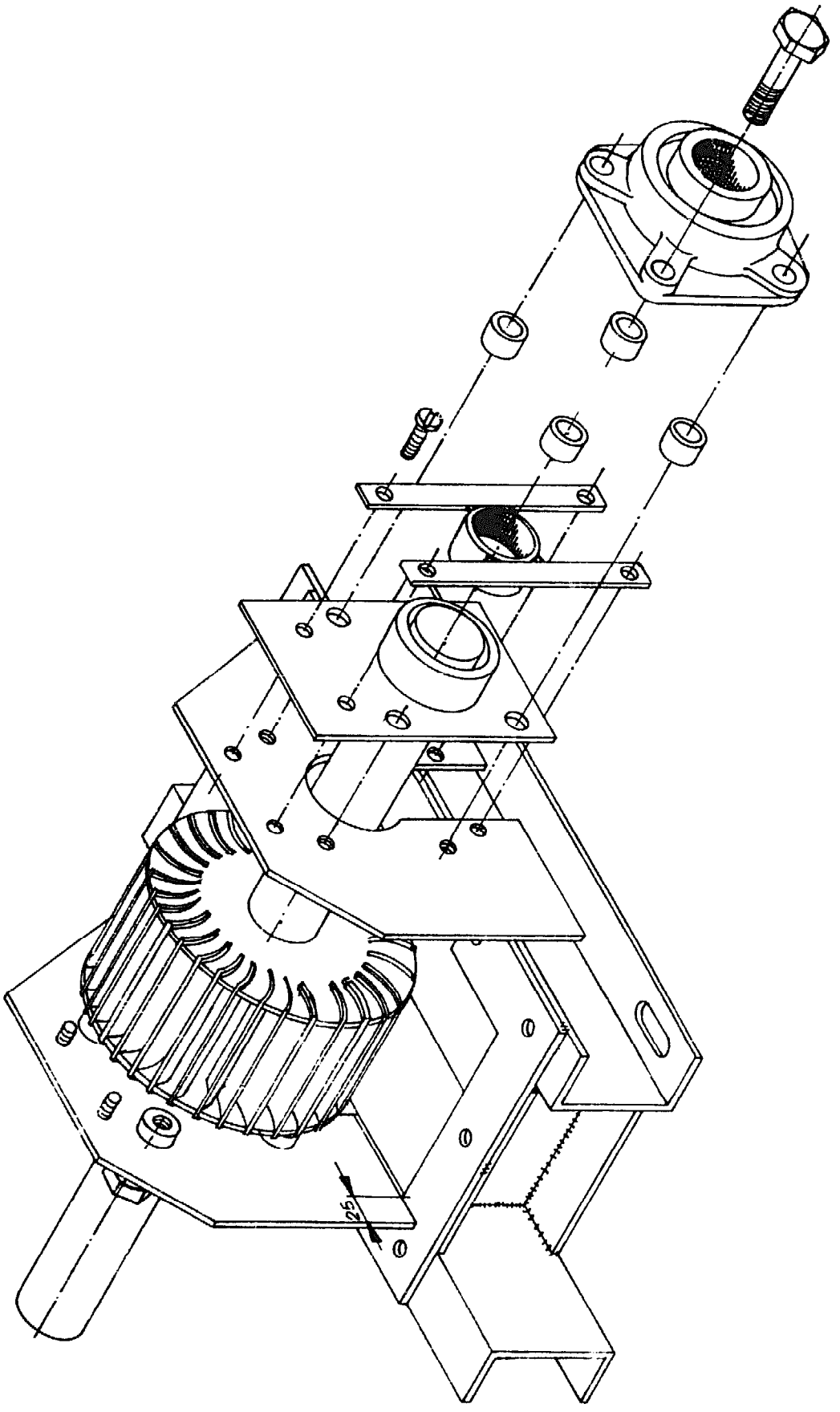
Example:

P = 30 kW, H_n = 20 m

→ b_o = 325 mm




50 +0.5 -0.5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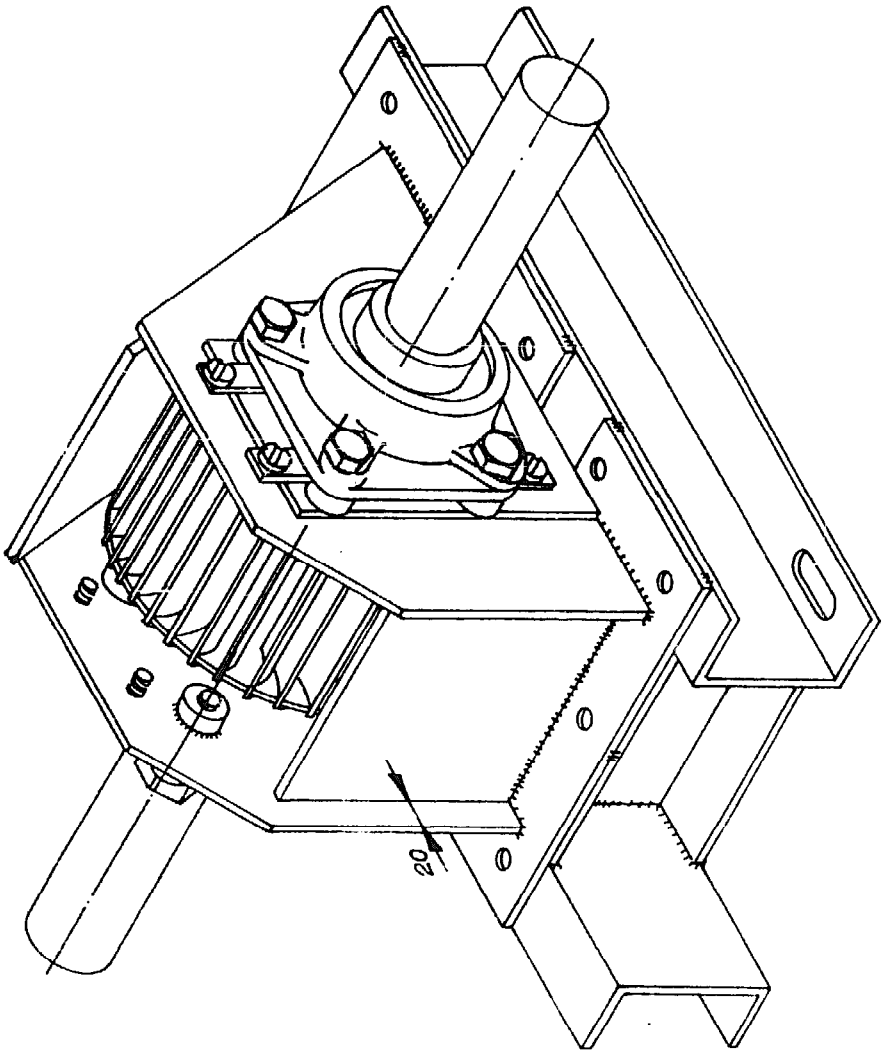
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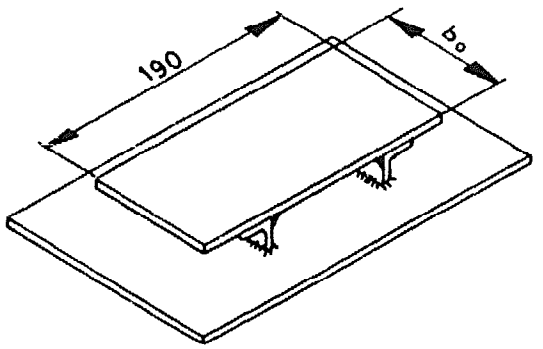
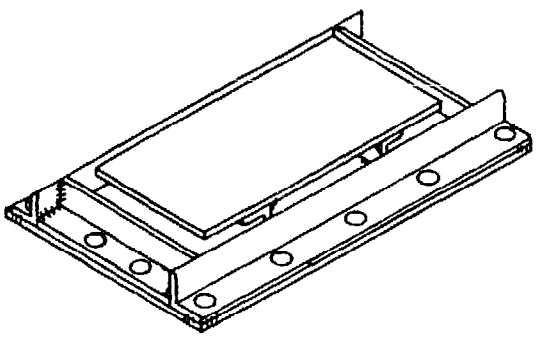
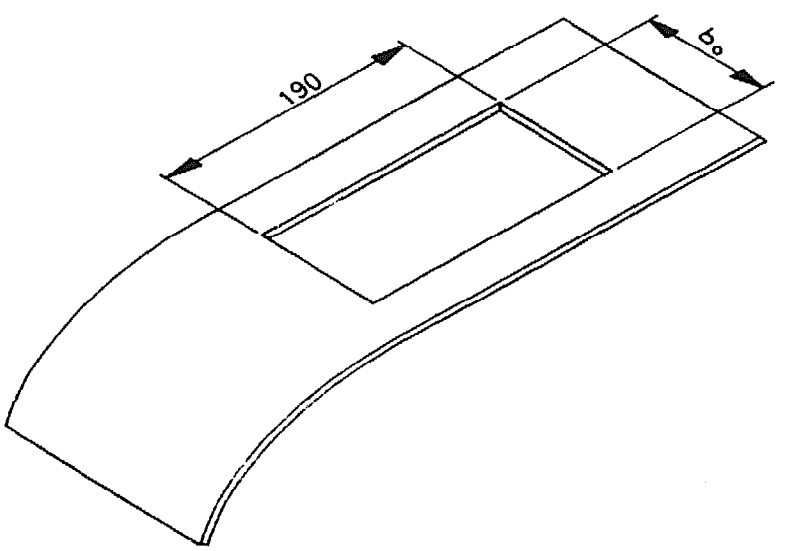
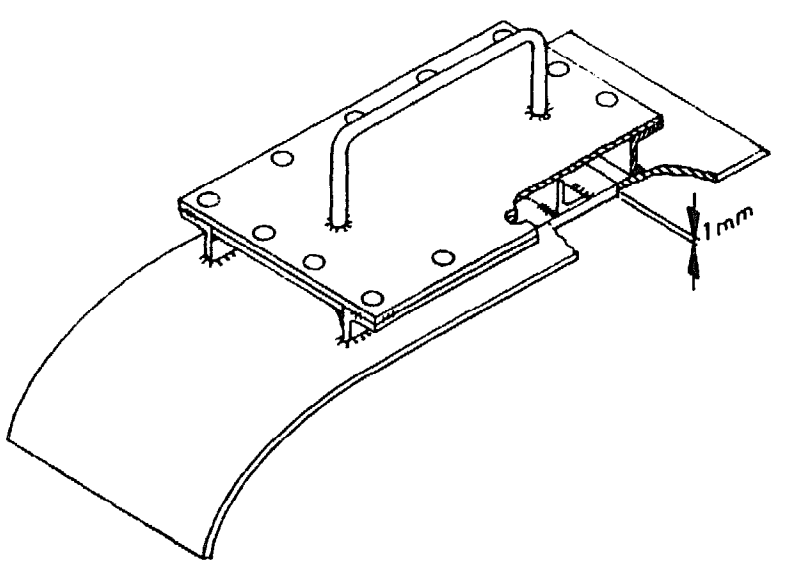
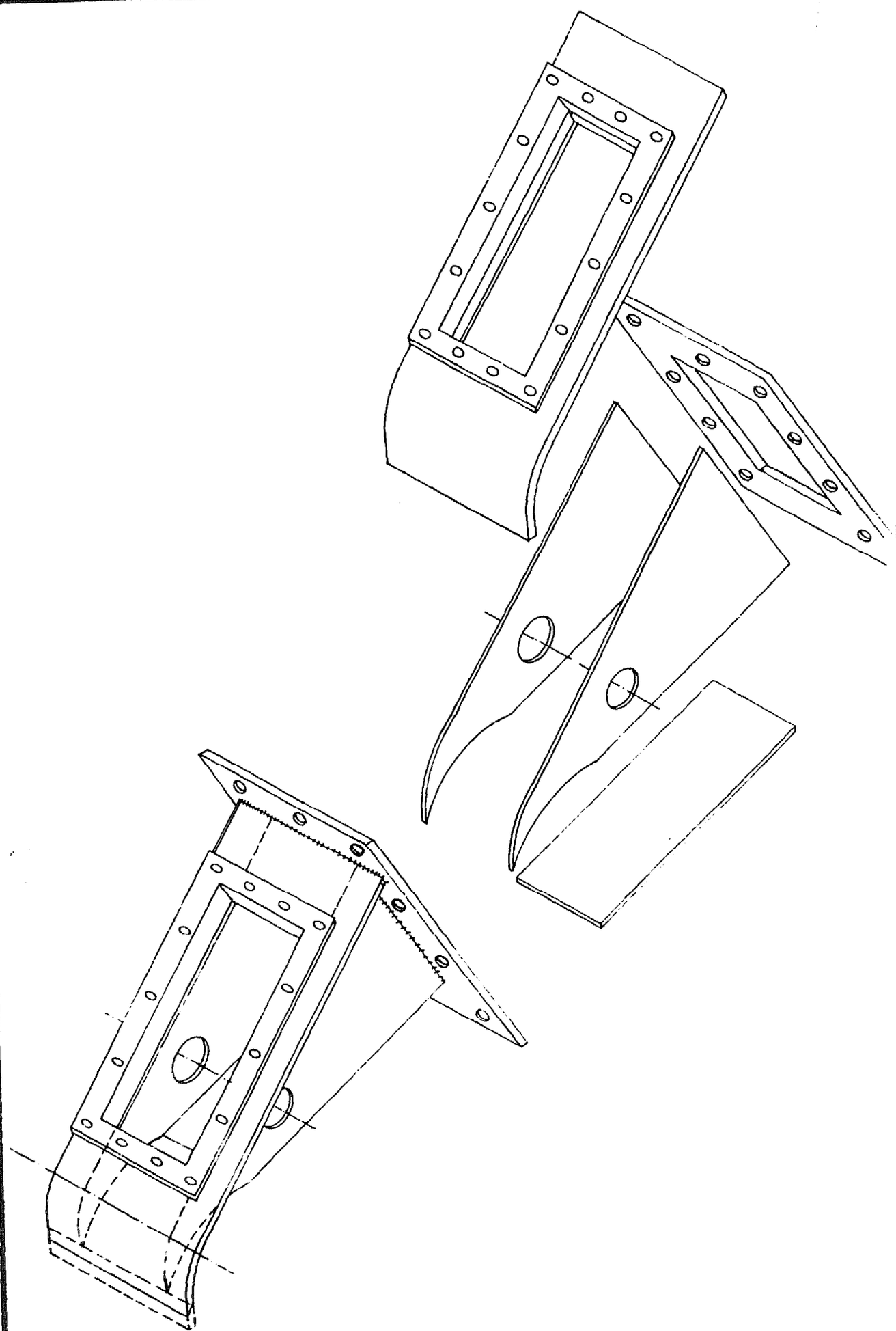
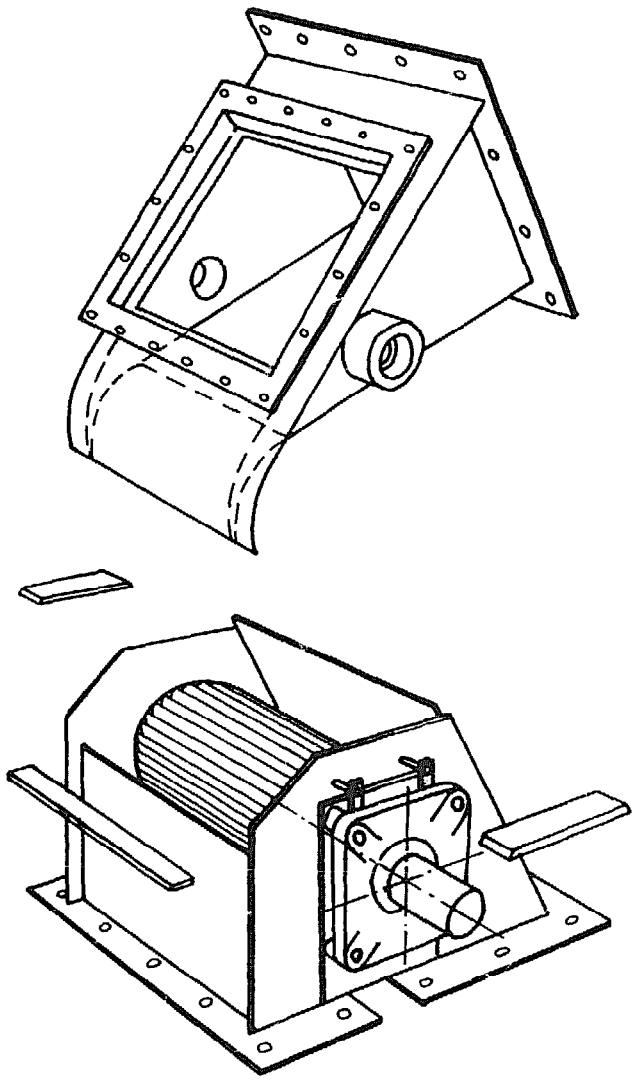

190
b_o

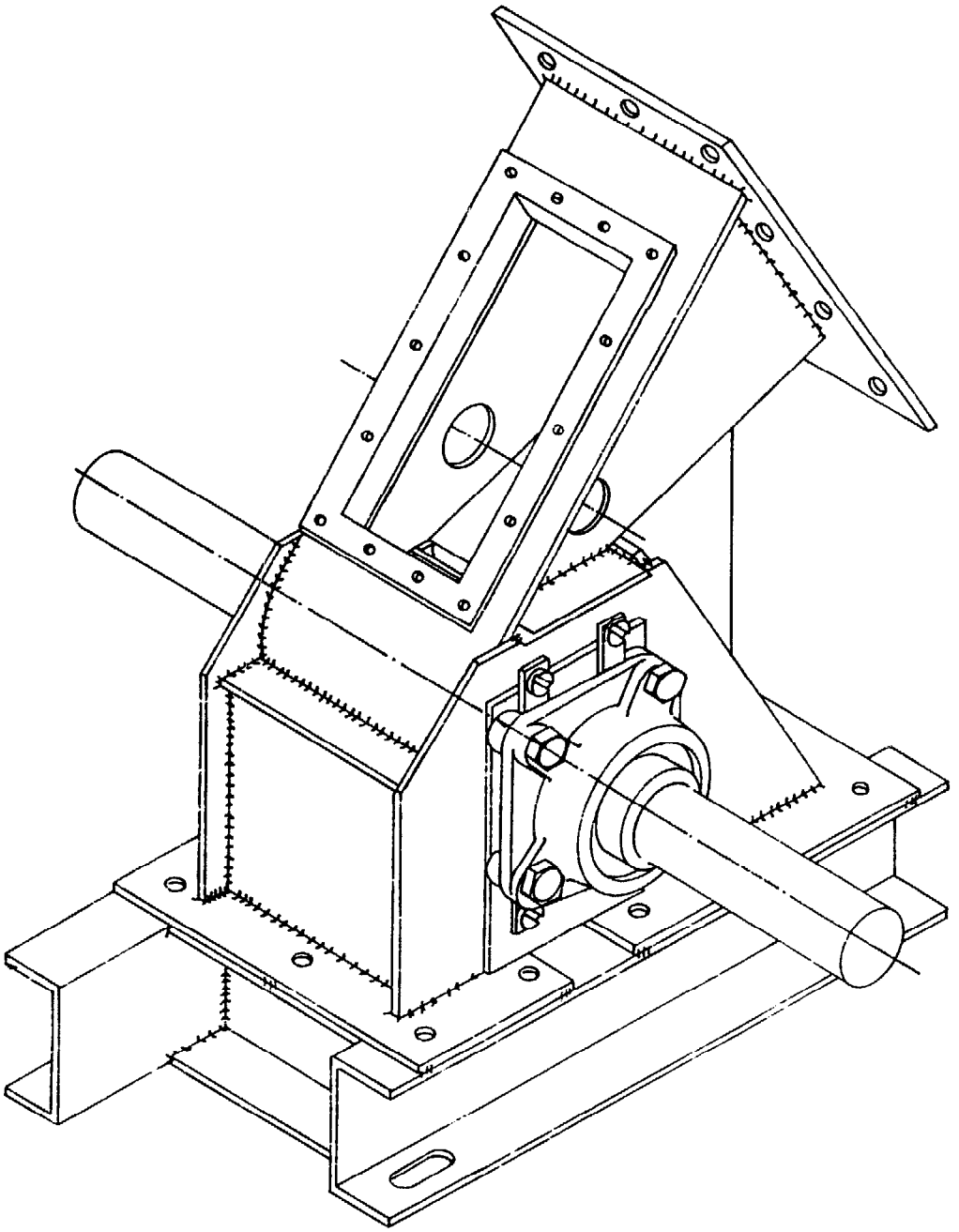


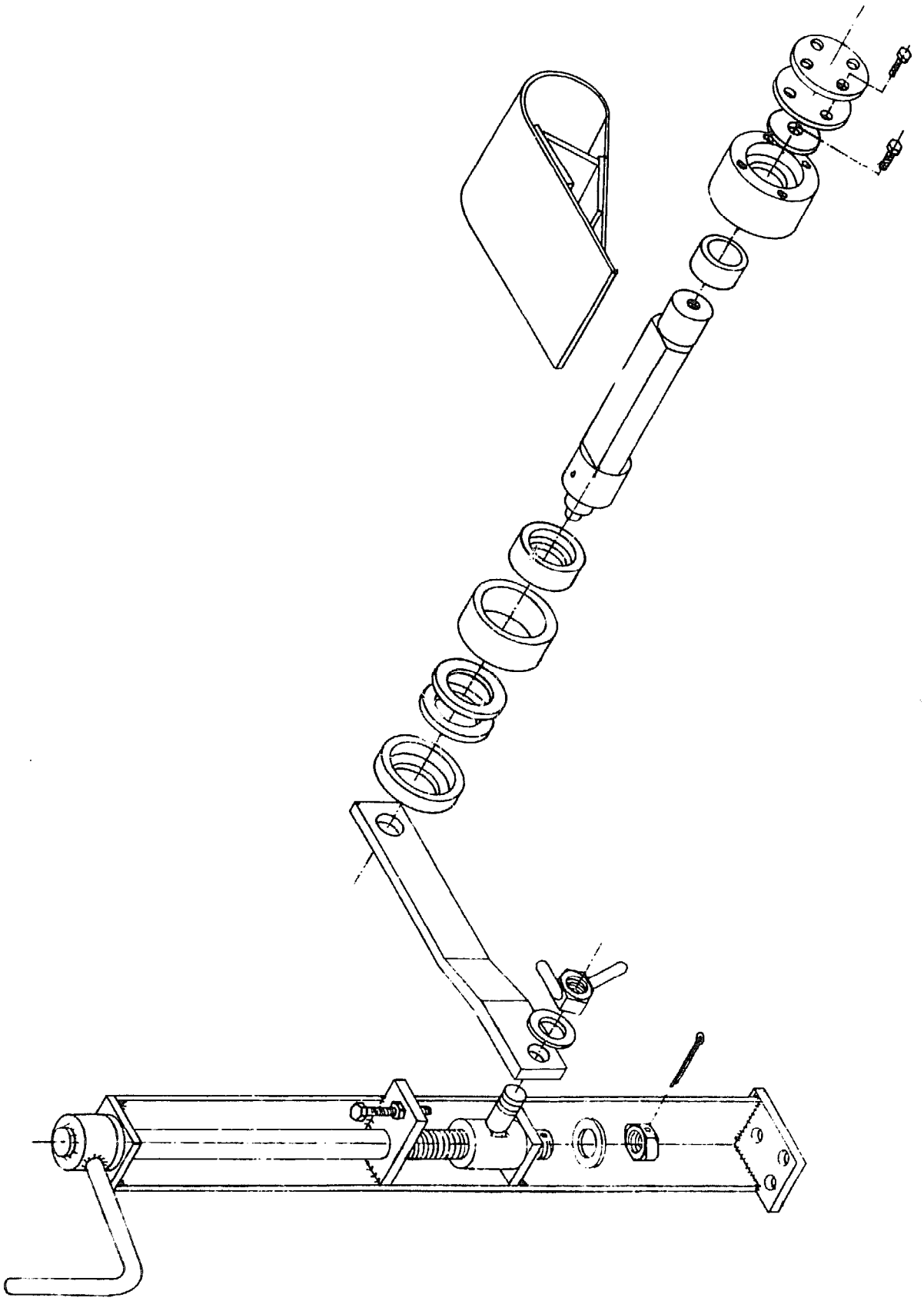

190
b_o

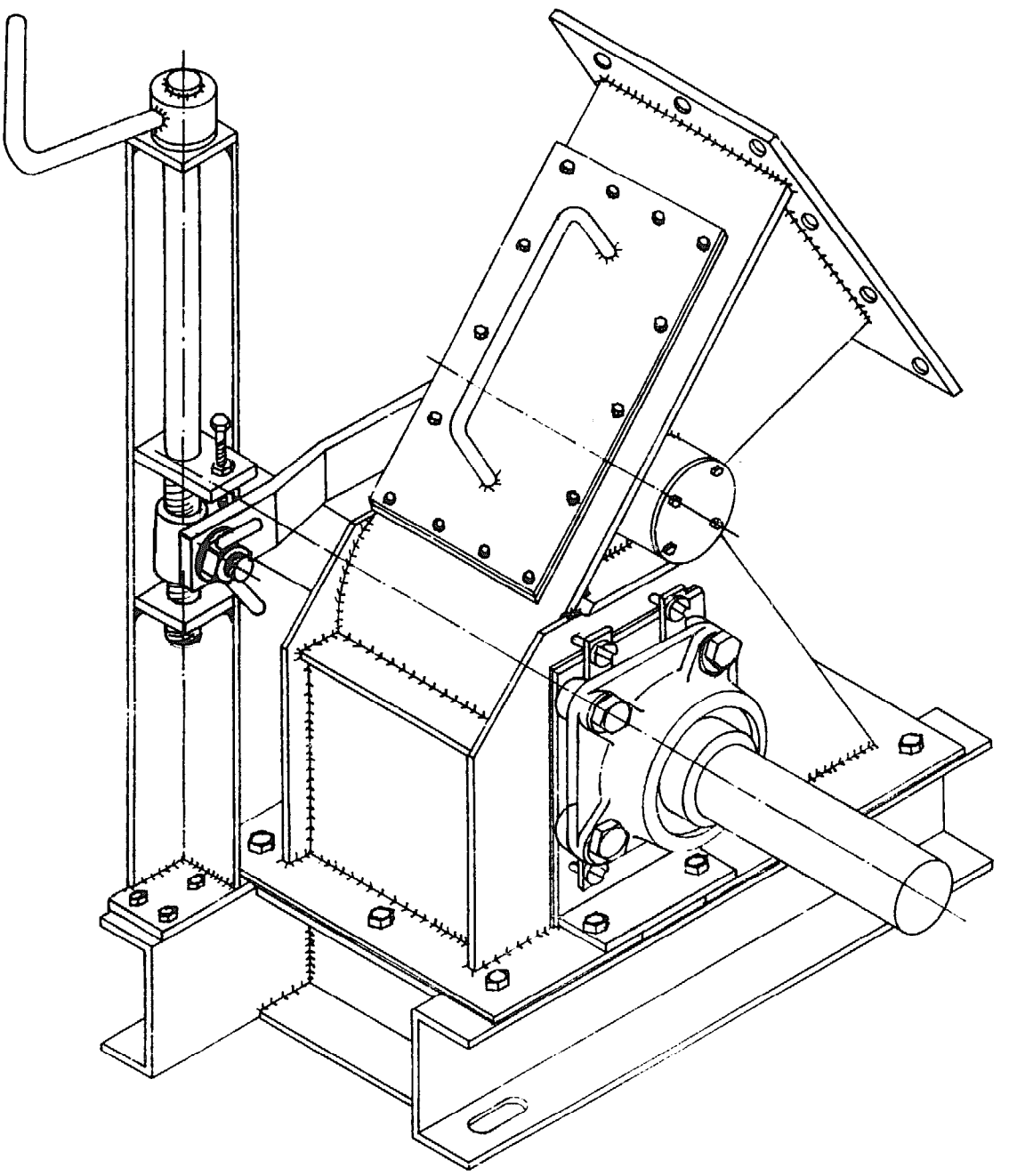

1mm



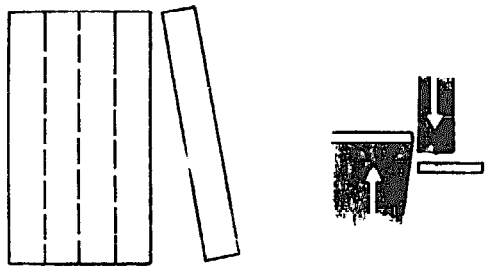




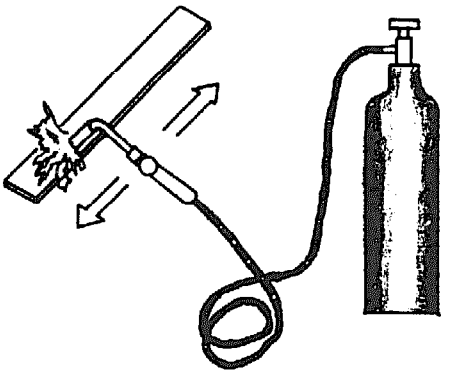




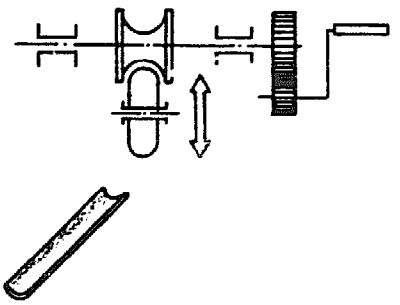
BLADE FABRICATION



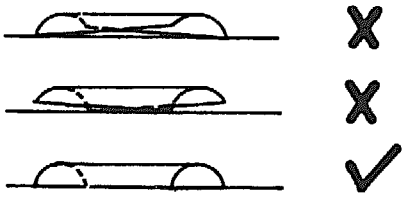
Take 2.5mm M.S.Sheet and shear if off according to required size.



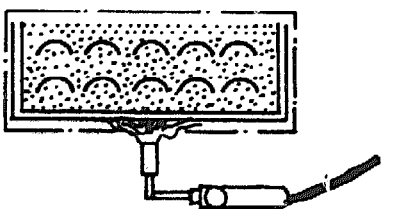
Heat the sheet up to 800 °C.



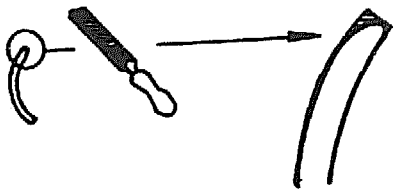
Roll it carefully.



Check whether the blade is twisted.
If so correct it.

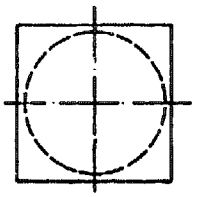
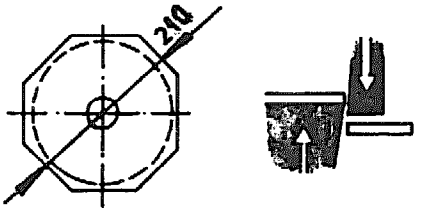
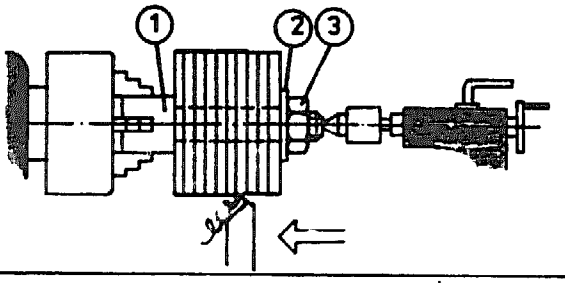
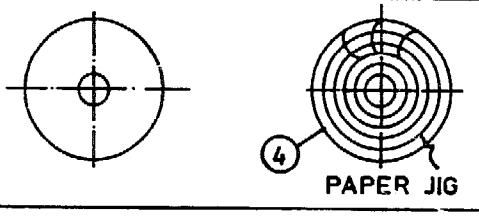
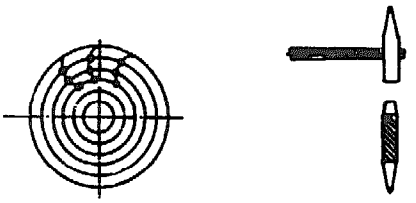
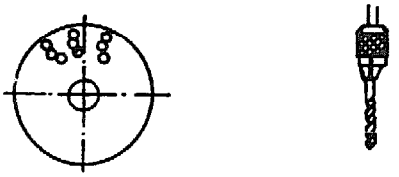
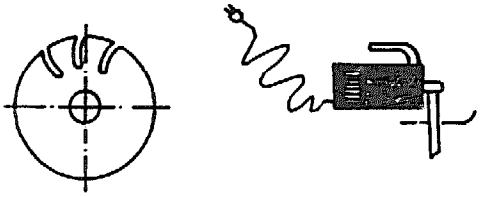
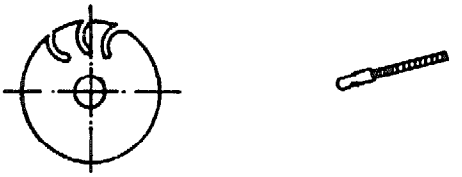


Pack the blades singly,as shown, in a metal box with cast iron chip stuffed all around them.Heat the box uniformly from all sides up to 600 °c.
Let it cool in air by itself.

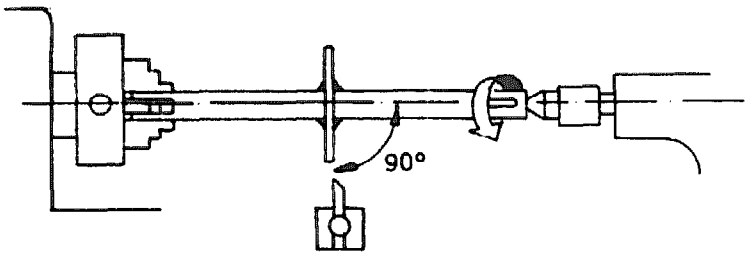


Make the edge profile by filing according to the drawing.
Let the other end of the blade be as it is.

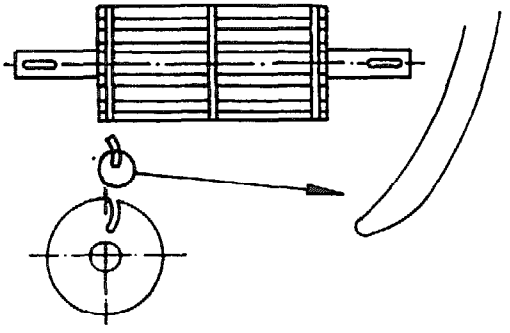
ROTOR DISC FABRICATION.

	Prepare mild steel sheet according to measurements (4mm thick by 210 x 210). Mark centre and draw a circle of Ø 205.
	Cut the four edges off by shearing. Bore a hole of Ø 50.5 in the centre.
	Use disc holder to put together 10pcs. Mount it on Lathe as shown and turn to Ø 205.
	Apply quick drying glue throughly on back side of the paper jig.Stick it on the disc.Make sure the paper jig coincides with disc.Press all over and let it dry.
	Centre punching.
	Drilling (Ø 3).
	If necessary do soft annealing at Temprature of 600 °C. Make slots with sliting saw machine.
	Finish by filing.Atleast 2pcs at a time.

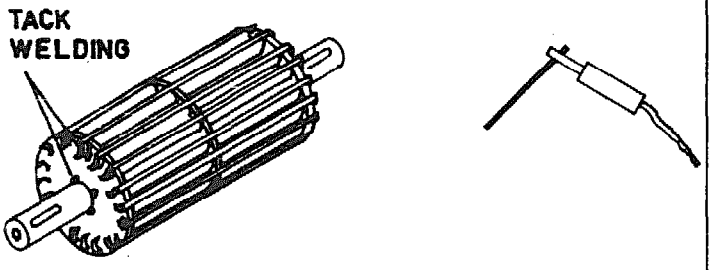
ROTOR FABRICATION.1



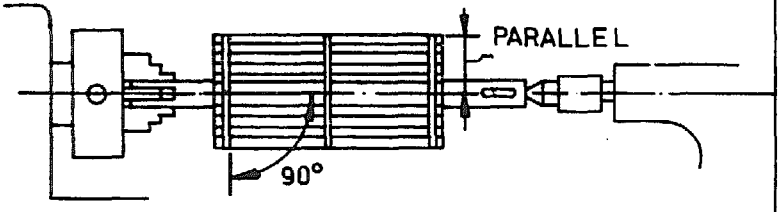
Place the middle disc in position. Do tack welding from both sides. Check the axis of the disc should be 90° to the axis of the shaft. Make full welding.



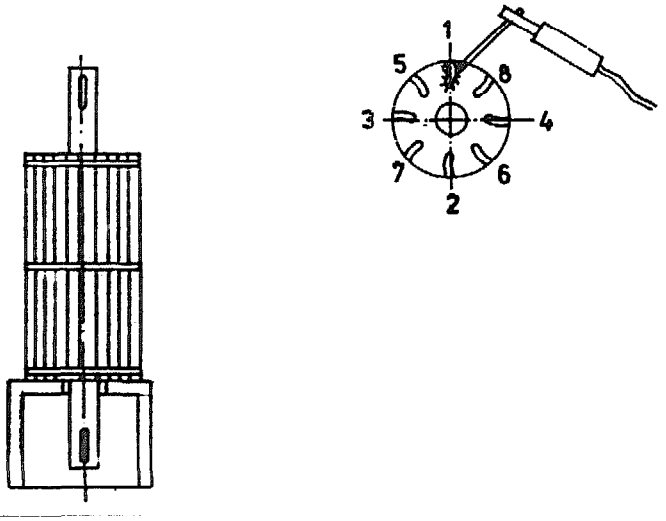
Place the outer discs in position. Insert the blades in the slots. Make sure that the filed dege profile falls inside. (See drawing)



Do tack welding of the blades on the outer disc and outer disc on the rotor (as shown) from out side only.

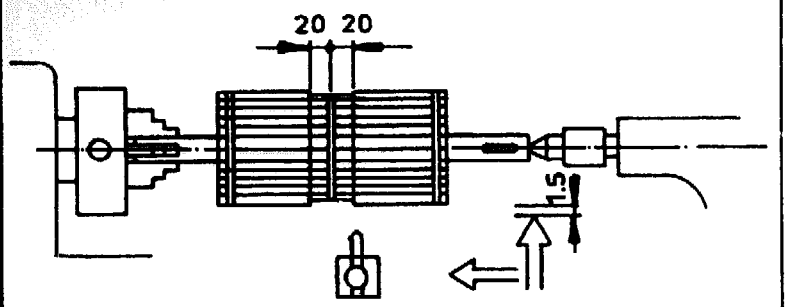


Mount it on Lathe and check ;
a) Disc should be 90° to the axis of the rotor.
b) The blade should be parallel to the axis of the rotor.

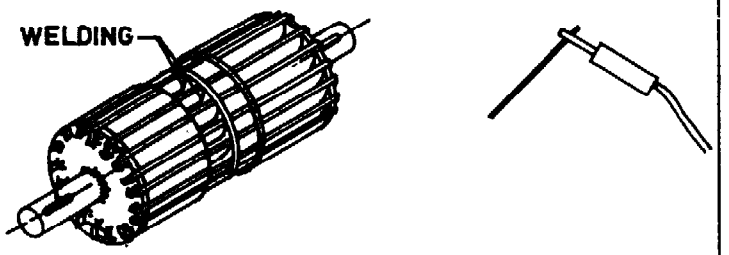


If it is alright place the rotor vertically up (as shown) on a drum or a specially made table with a hole big enough to put the shaft end thruogh. Continue welding from out side. only and alternately (as shown)

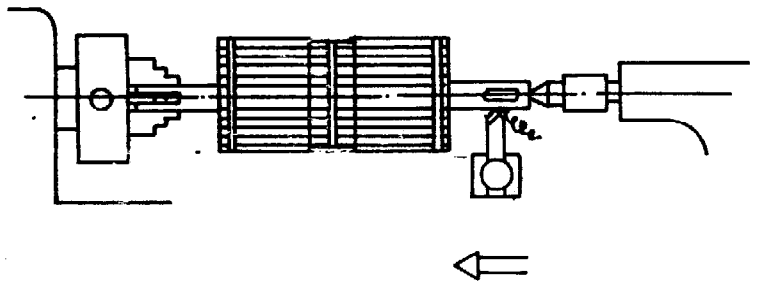
ROTOR FABRICATION.2



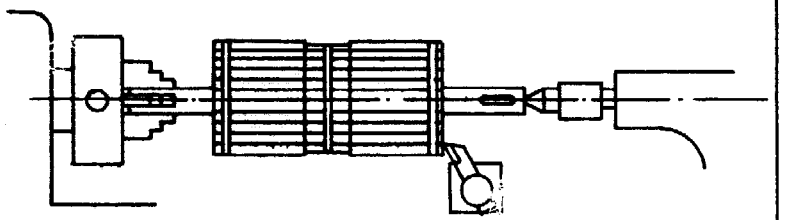
Turn eachside up to 20 mm from the middle disc to Ø 202. Remove burr which may bostruct welding rod.



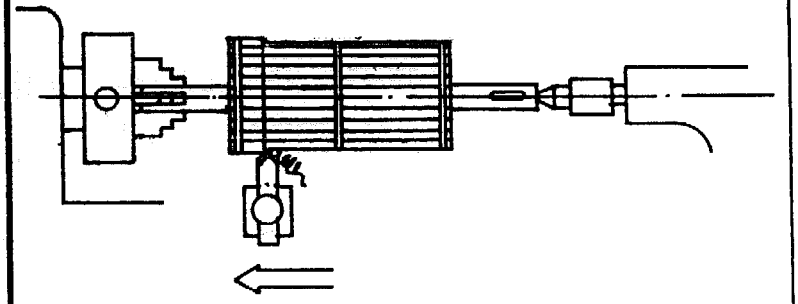
Make full welding on the middle disc alternatively opposite side of the disc.



Turn the rotor shaft to Ø 50



Facing off



Turn the rotor shaft to final Ø of 200.
Turn the rotor shaft 180° to carry on turning and facing of the other side.
Remove burr from rotor blade edges.

POS	PCS	DENOMINATION	DRAWING NUMBER	SPECIFICATION	REMARK
1	1	BASE FRAME	T3/01/00	M.S CHANNEL 100X50	
2		GASKET	T3/02/00	RUBBER 6MM	
3	1	ROTOR HOUSING ASSEMBLY	T3/03/00		ASSEMBLY
4	1	RIB	T3/04/00	M.S.SHEET 5MM	
5	2	BRACING PLATE	T3/05/00	M.S.FLAT 38X6	
6	1	INLET	T3/06/00		ASSEMBLY
7	1	INLET GASKET	T3/07/00	RUBBER 6MM	
8	1	ROTOR	T3/08/00		ASSEMBLY
9	2	ROTOR BEARING	T3/09/00		
10	2	STUFFING BOX	T3/10/00		ASSEMBLY
11	8	SPACER	T3/11/00	M.S.ROD ϕ25 (1")	
12	2	PRESS RING	T3/12/00		
13	2	STUFFING PLATE GASKET	T3/13/00	RUBBER	
14	2	SEALING PLATE	T3/14/00	M.S.SEET 3MM	
15	2	SEALING PAD	T3/15/00	RUBEER 6MM	
16	1	BUTTERFLY VALVE SHAFT	T3/16/00	M.S.ROD ϕ50 (2")	
17	1	CUP BUSH	T3/17/00	M.S.ROD ϕ64 (2 1/2")	
18	2	SEALING RING	T3/18/00	RUBBER 6MM	
19	1	PIVOTAL BUSH '1'	T3/19/00	BRASS ROD ϕ50(2")	
20	1	BUSH CASING '1'	T3/20/00	M.S.ROD ϕ64 (2 1/2")	
21	1	BUSH CASING '2'	T3/21/00	M.S.ROD ϕ64 (2 1/2")	
22	1	PIVOTAL BUSH '2'	T3/22/00	BRASS ROD ϕ38 (1 1/2")	
23	1	GASKET	T3/23/00	RUBBER 2MM	
24	1	COVER	T3/24/00	M.S.SHEET 3MM	
25	1	WASHER	T3/25/00		
26	1	LEVER	T3/26/00	M.S.FLAT 38X10	
27	1	LOCK NUT	T3/27/00	M.S.ROD ϕ38 (11/2"),ϕ16(3/4")	
28	1	SPINDLE	T3/28/00	M.S.ROD ϕ 20 (1")	
29	1	STAND ASSEMBLY	T3/29/00		ASSEMBLY
30	1	HANDLE	T3/30/00	M.S.ROD ϕ15 (5/8")	
31	1	KNOB	T3/31/00	M.S.ROD ϕ38(1 1/2")	
32	1	BUSH	T3/32/00	BRASS ROD ϕ38(11/2")	
33	2	WASHER	T3/33/00		
34	1	COTTER PIN	T3/34/00		
35	1	BUTTER FLY VALVE	T3/35/00		
36	1	WING NUT	T3/36/00	M16	
37	8	WASHER	T3/37/00		
38	8	HEX.BOLT	T3/38/00	M14	
39		HEX.BOLT	T3/39/00	M12	
40		HEX.NUT	T3/40/00	M12	
41	1	HEX.BOLT	T3/41/00	M8	
42	4	HEX.BOLT	T3/42/00	M6	
43	8	HEX.BOLT	T3/43/00	M6	
44	8	HEX.NUT	T3/44/00	M6	
45		HEX.BOLT	T3/45/00	M6	
46		HEX.NUT	T3/46/00	M6	
47		HEX.BOLT	T3/47/00	M6	
48		HEX.NUT	T3/48/00	M6	
49		HEX.BOLT	T3/49/00	M6	
50		HEX.NUT	T3/50/00	M6	
51		HEX.NUT	T3/51/00	M16	
52	1	ADAPTER	T3/52/00		ASSEMBLY

C.F.TURBINE TYPE 3

T3/00/00 | S01

PART LIST

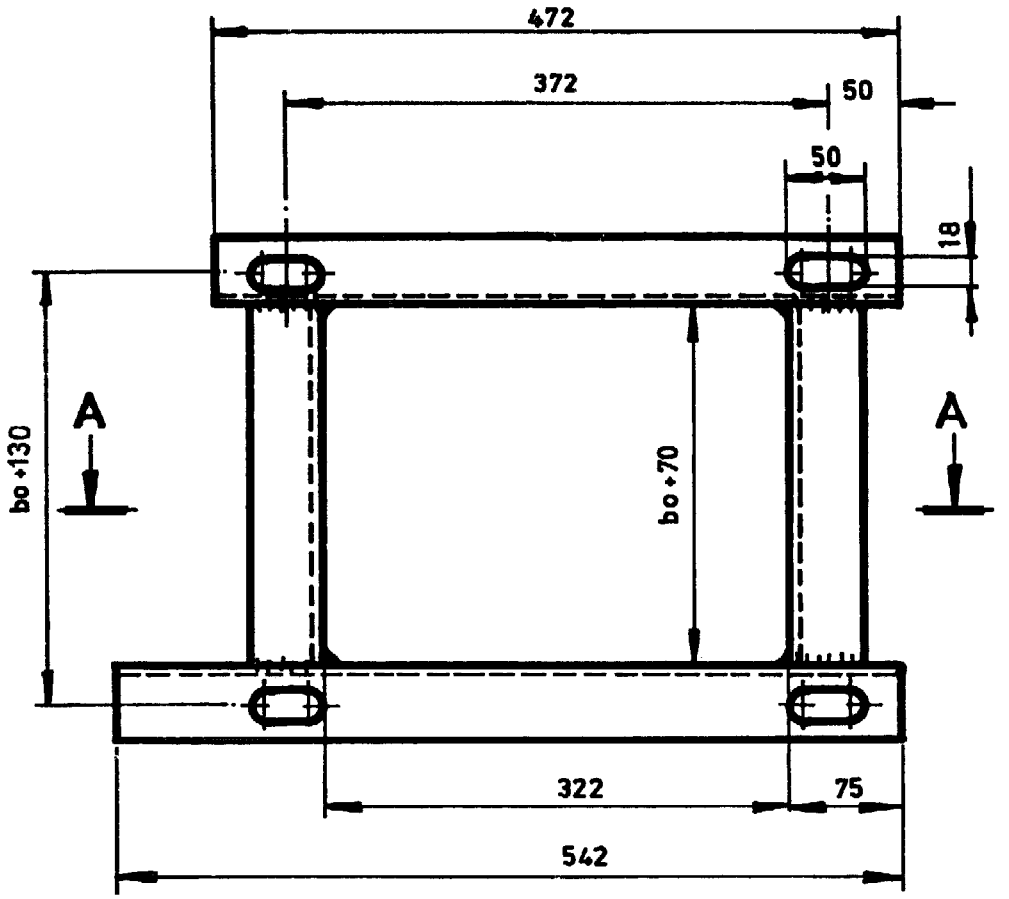
SECTION B-B

SECTION C-C

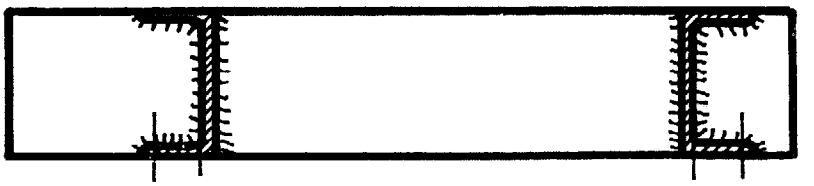
SECTION A-A

SECTION D-D

C.F. TURBINE TYPE 3	1:1	DRN	DT
		CKD	DT
B.Y.S. RESEARCH AND DEVELOPMENT UNIT		DRAWING NUMBER	SHEET
		T3/00/00	0



A-A



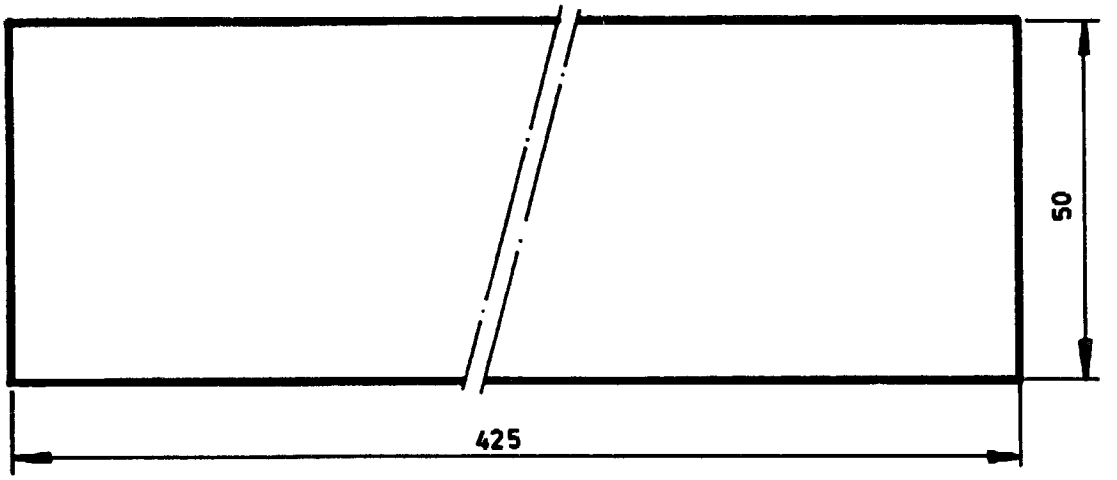
M.S.CHANNEL 100 X 50

1.PC

BASE FRAME

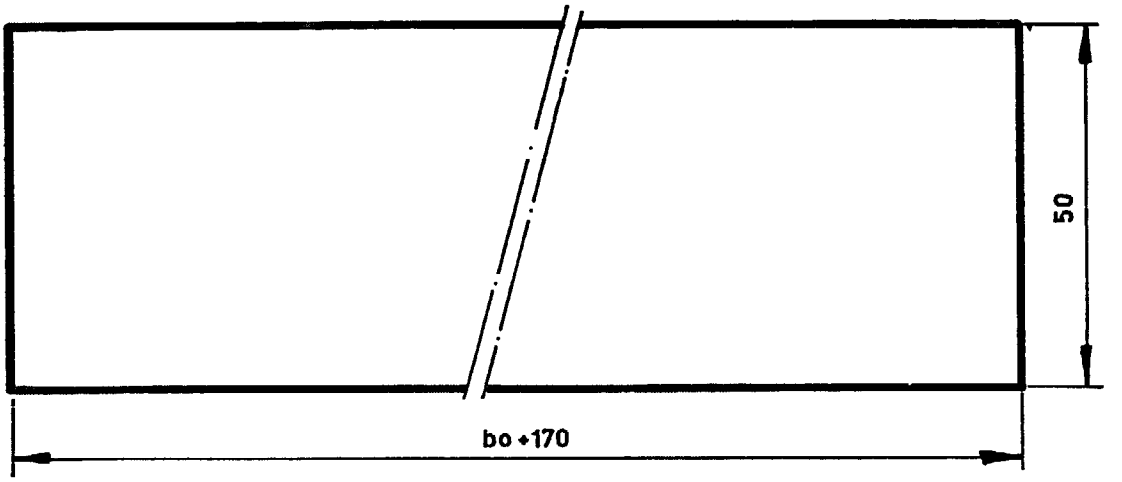
T3/01/00 | S02

1 : 5



RUBBER 6MM

2.PCS



RUBBER 6MM

2.PCS

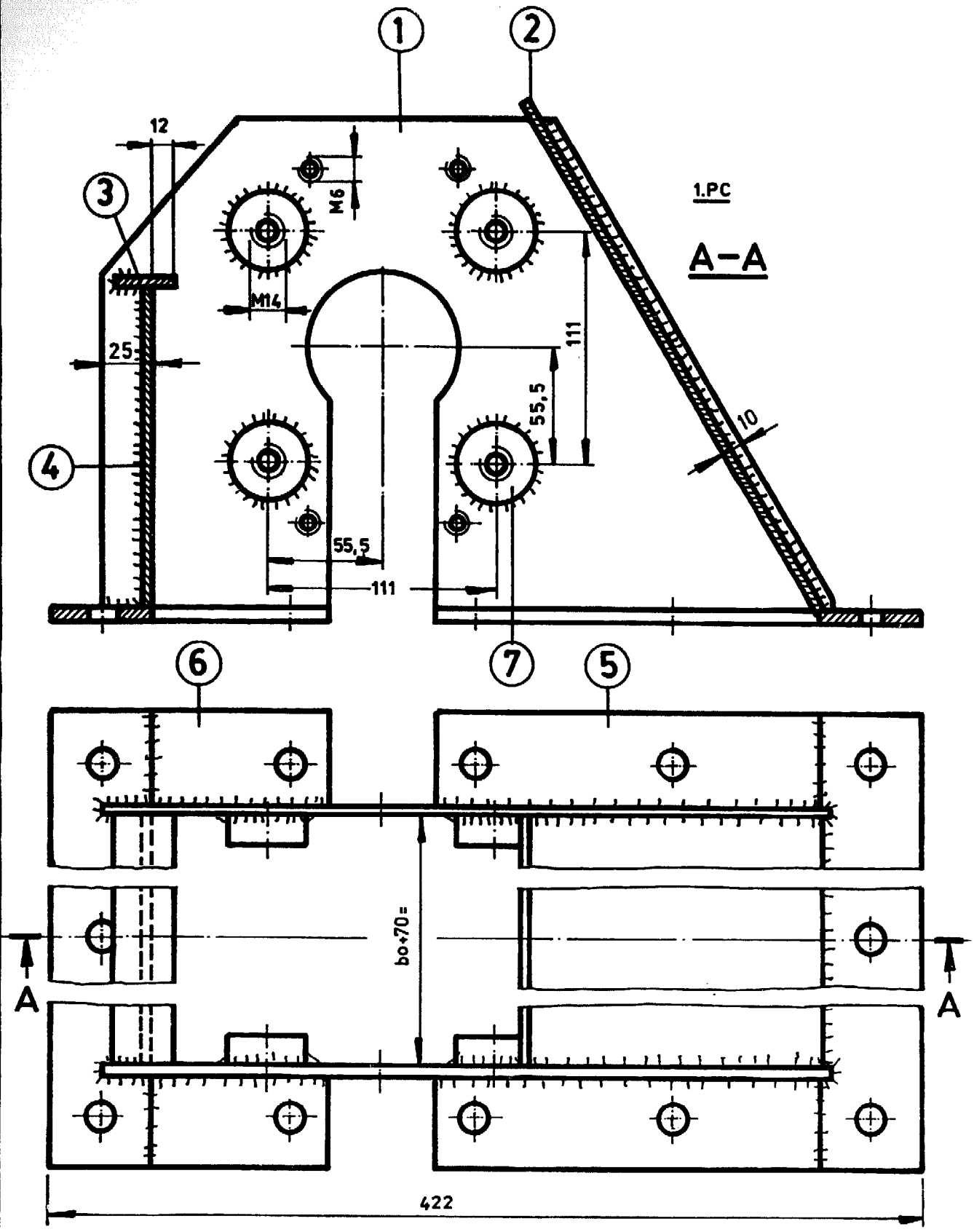
GASKET

T3/02/00 | S03

1	2	SIDE PLATE	T3/03/01	M.S.PLATE 5MMX253X235
2	1	BAFFLE PLATE	T3/03/02	M.S.PLATE 5MMX284Xbo+70
3	1	SPACER PLATE	T3/03/03	M.S.FLAT 30X6 Xbo+70
4	1	REAR BAFFLE PLATE	T3/03/04	M.S.PLATE 5MM X155Xbo+70
5	1	HOUSING BASE FRONT	T3/03/05	M.S.FLAT 50X6 Xbo+542
6	1	HOUSING BASE REAR	T3/03/06	M.S.FLAT 50X6 Xbo+338
7	8	THREAD STUB	T3/03/07	M.S.ROD ϕ25X15

ROTOR HOUSING ASSEMBLY T3/03/00 | S04

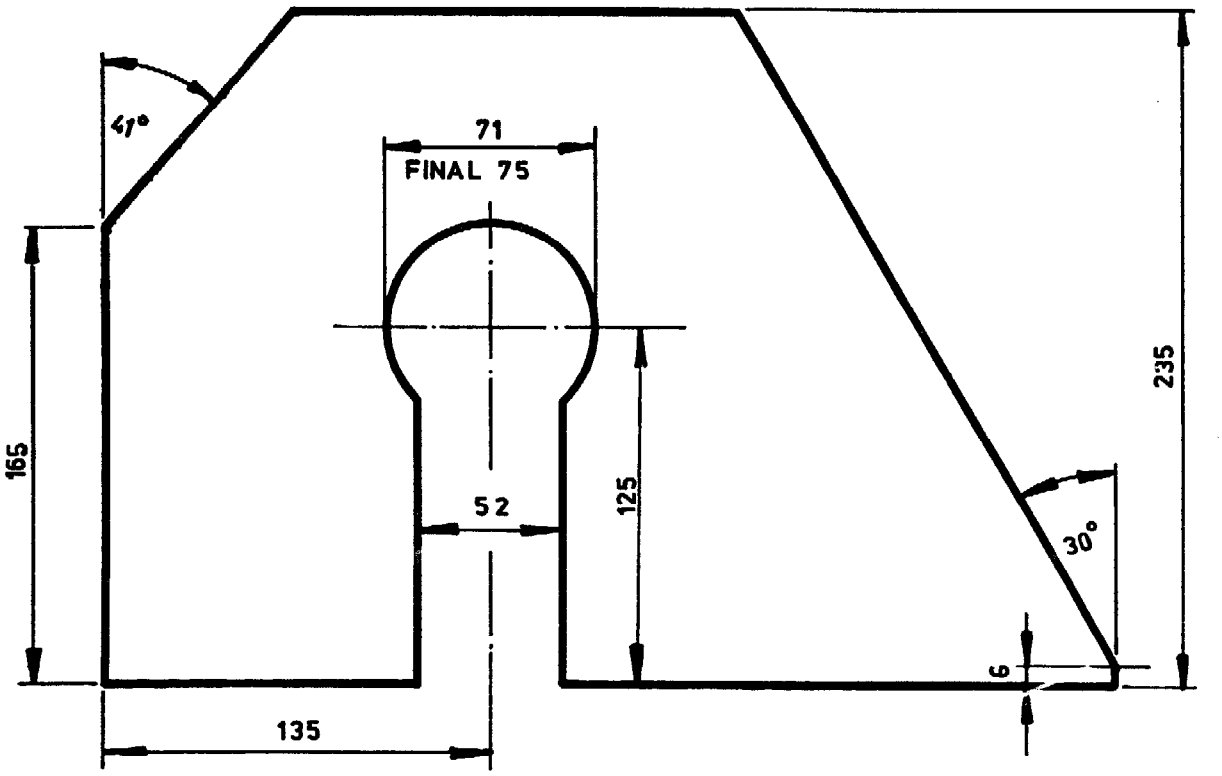
PART LIST

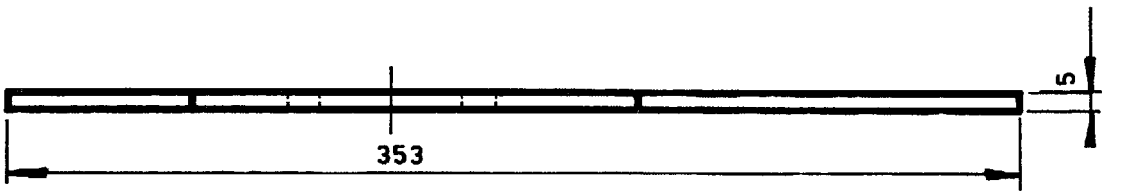


NOTE A, WELD POS.3 TOGETHER WITH INLET ASSEMBLY
B. USE JIG.NO 01 TO DRILL HOLES FOR THREADS M6 AND M14

ROTOR HOUSING ASSEMBLY T3/03/00 S05

1: 2,5





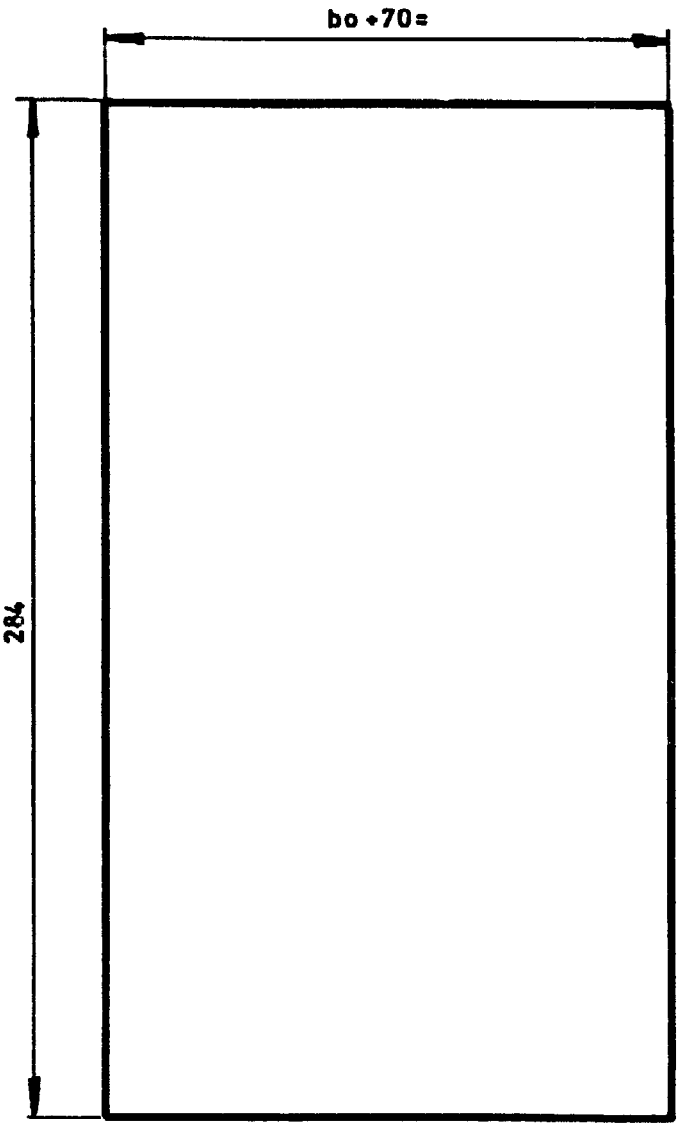
M.S.PLATE

2.PCS

SIDE PLATE

T3/03/01 | S06

1:2.5



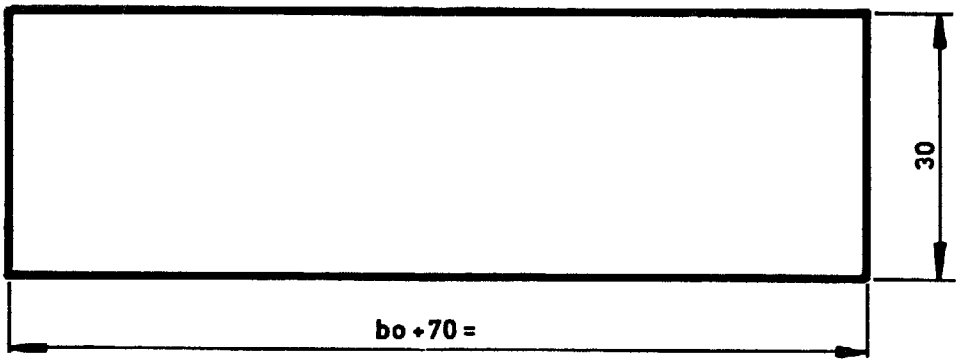
M.S.PLATE 5MM

1PC

BAFFLE PLATE

T3/03/02

S07

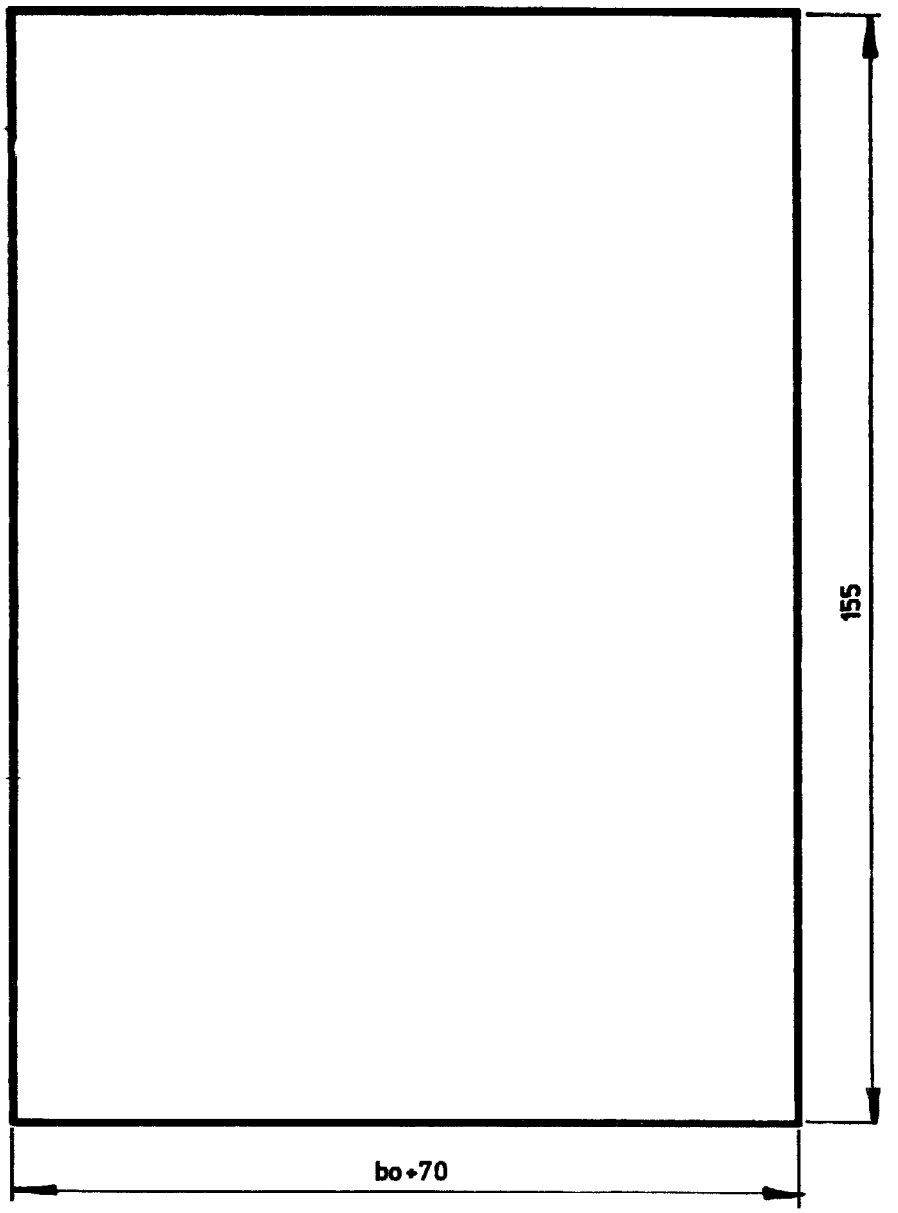


M.S.PLATE 6MM

1.PC

SPACER PLATE

T3/03/03 | S08



M.S. PLATE 5MM

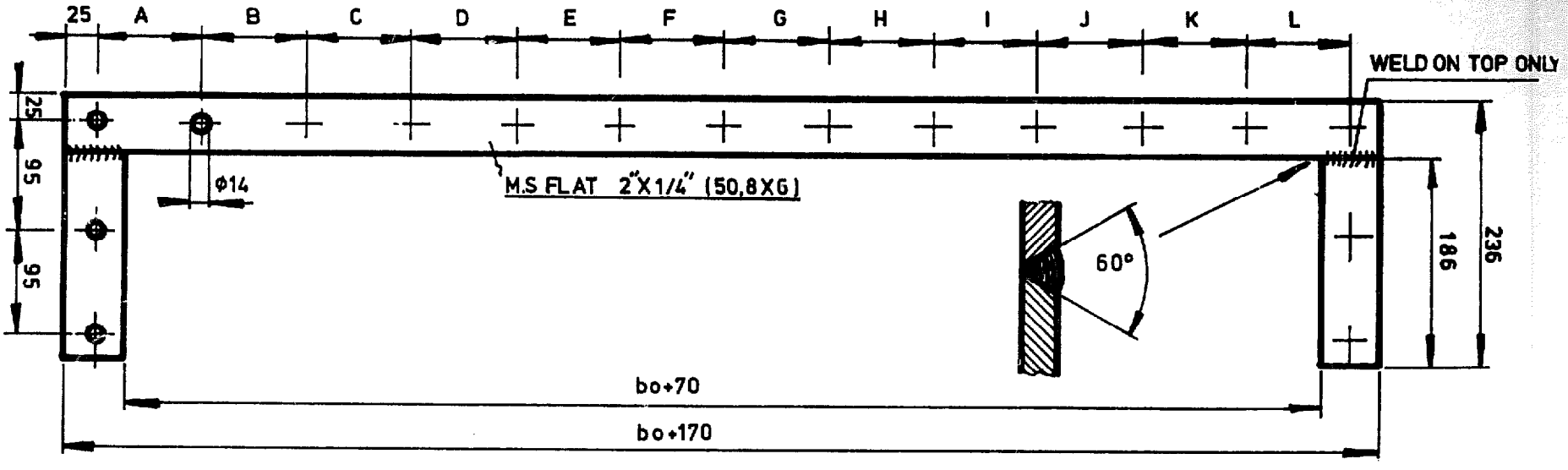
1.PC

REAR BAFFLE PLATE

T3/03/04 S09

HOUSING BASE FRONT

T3/03/05 S10

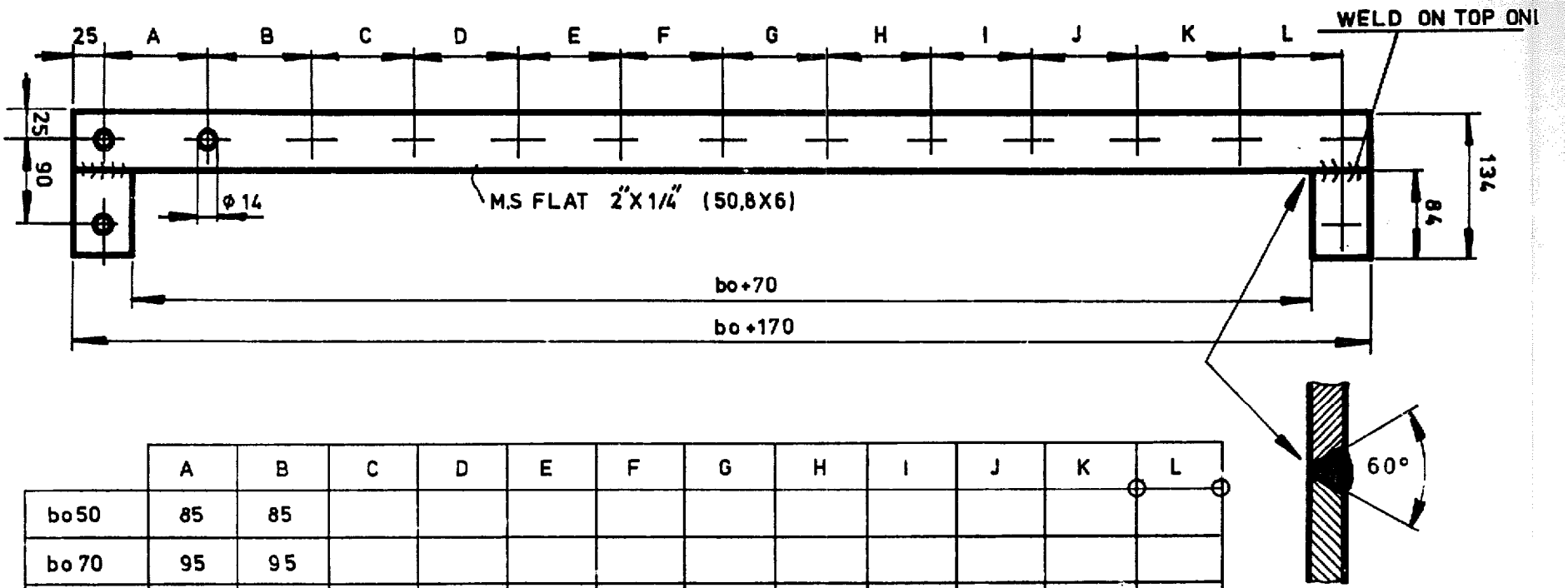


	A	B	C	D	E	F	G	H	I	J	K	L
bo50	85	85										
bo70	95	95										
bo90	105	105										
bo120	80	80	80									
bo160	93	94	93									
bo220	85	85	85	85								
bo290	82	82	82	82	82							
bo390	85	85	85	85	85	85						
bo520	80	80	80	80	80	80	80	80				
bo690	81	81	81	81	81	81	81	81	81	81		
bo920	86	86	87	87	87	87	87	87	87	87	86	86

DRILL HOLES TOGETHER WITH BASE FRAME

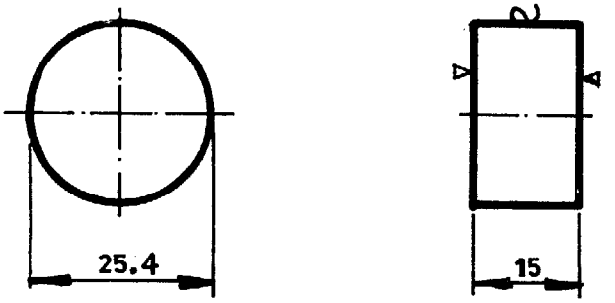
HOUSING BASE REAR

T3/03/06 S11



	A	B	C	D	E	F	G	H	I	J	K	L
bo50	85	85										
bo 70	95	95										
bo90	105	105										
bo120	80	80	80									
bo160	93	94	93									
bo 220	85	85	85	85								
bo290	82	82	82	82	82							
bo 390	85	85	85	85	85	85						
bo 520	80	80	80	80	80	80	80	80				
bo 690	81	81	81	81	81	81	81	81	81	81		
bo 920	86	86	87	87	87	87	87	87	87	87	86	86

DRILL HOLE TOGETH
WITH BASE FRAME



M.S.ROD ϕ1"

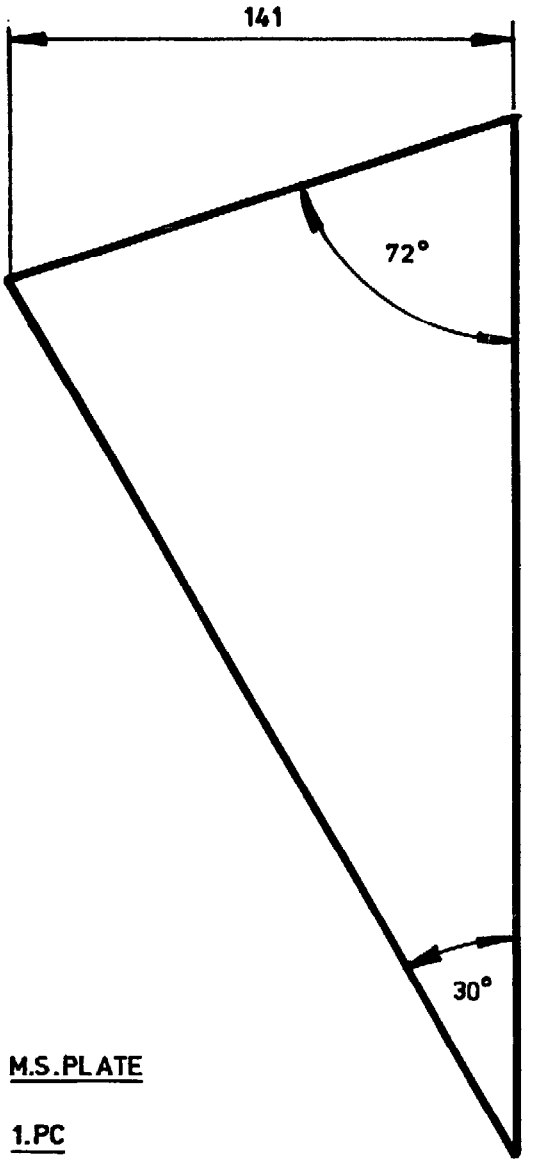
8.PCS

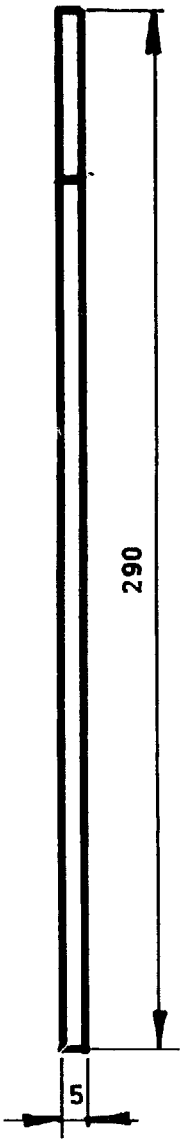
THREAD STUB

T3/03/07

S 12

1:1





M.S.PLATE

1.PC

RIB

1:2

T3/04/00 | S13

M.S.FLAT

2.PCS

BRACING PLATE

T3/05/00

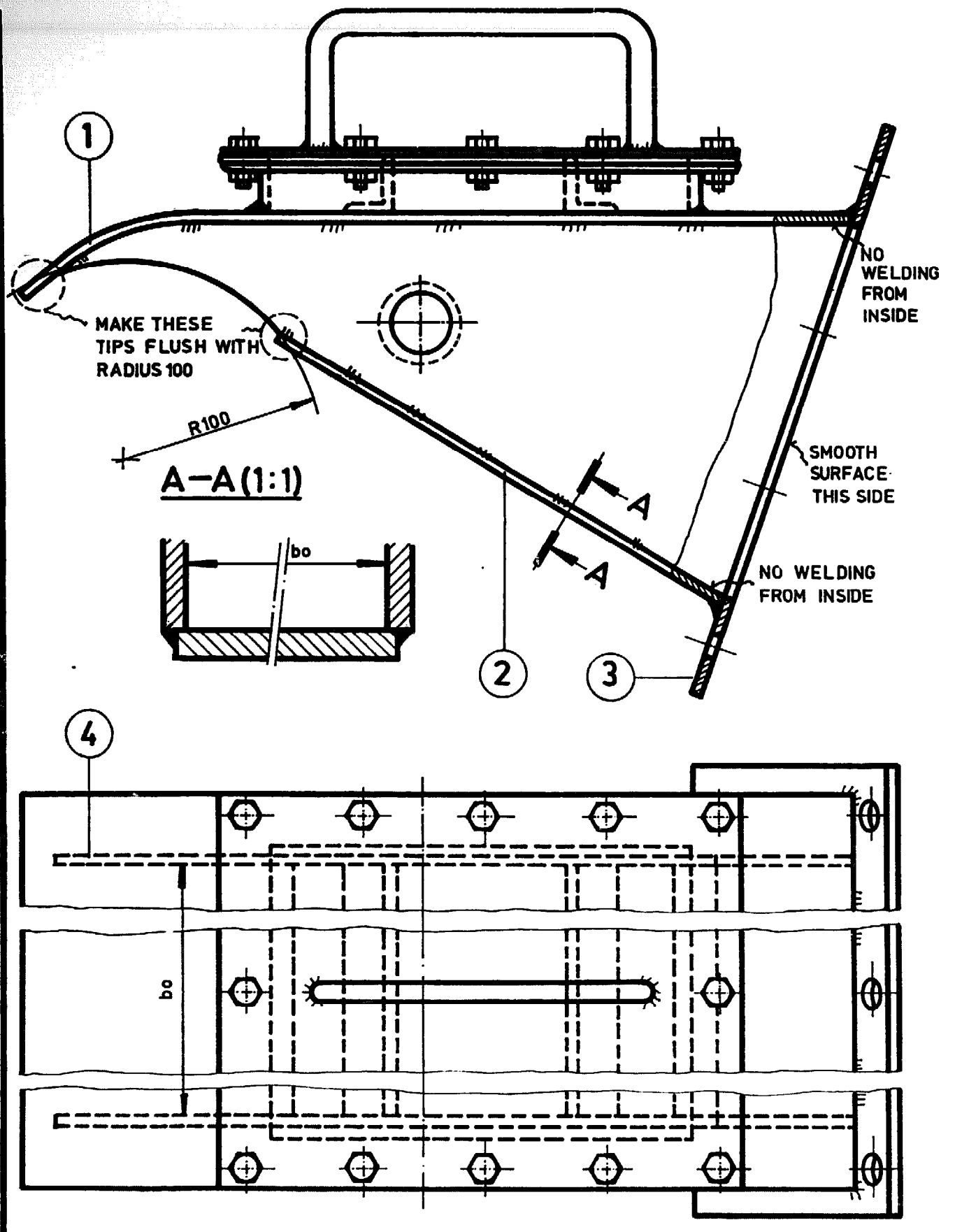
S14

1:1

POS	PCS	DENOMINATION	DRAWING NUMBER	SPECIFICATION	REMARKS
1	1	INLET TOP ASSEMBLY	T3/06/01	ASSEMBLY	
1-1	1	INLET TOP PLATE	T3/06/01-1	M.S.PLATE 5MMX450Xbo+70	
1-2	1	HATCH DOOR FRAME	T3/06/01-2	M.S.ANGLE 25X25X5	
				520X2(bo+20)	
1-3	1	HATCH DOOR	T3/06/01-3	M.S.PLATE 5MMX260Xbo+70	
	1			" " 190Xbo	
	2			M.S.ANGLE 25X25X5 Xbo	
1-4	1	HATCH DOOR GASKET	T3/06/01-4	RUBBER 2MM X260Xbo+70	
2	1	INLET BOTTOM PLATE	T3/06/02	M.S.PLATE 5MMX260Xbo+4	
3	2	INLET FLANGE	T3/06/03	M.S.FLAT 50X6	
				400X2(bo+100)	
4	2	INLET SIDE PLATE	T3/06/04	M.S.PLATE 5MMX189X401	

INLET ASSEMBLY T3/06/00 S1

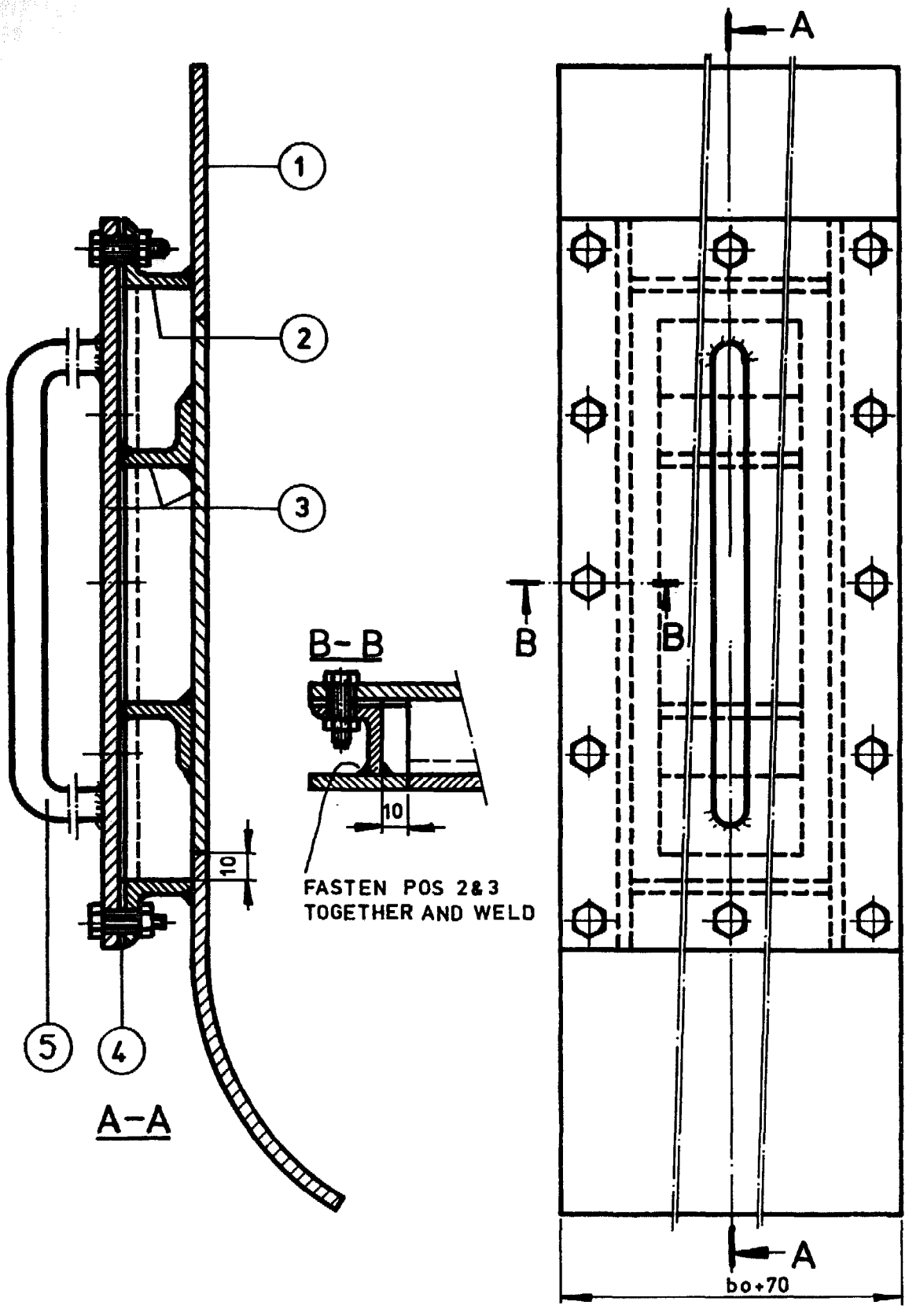
PART LIST



INLET ASSEMBLY

T3/06/00 | S16

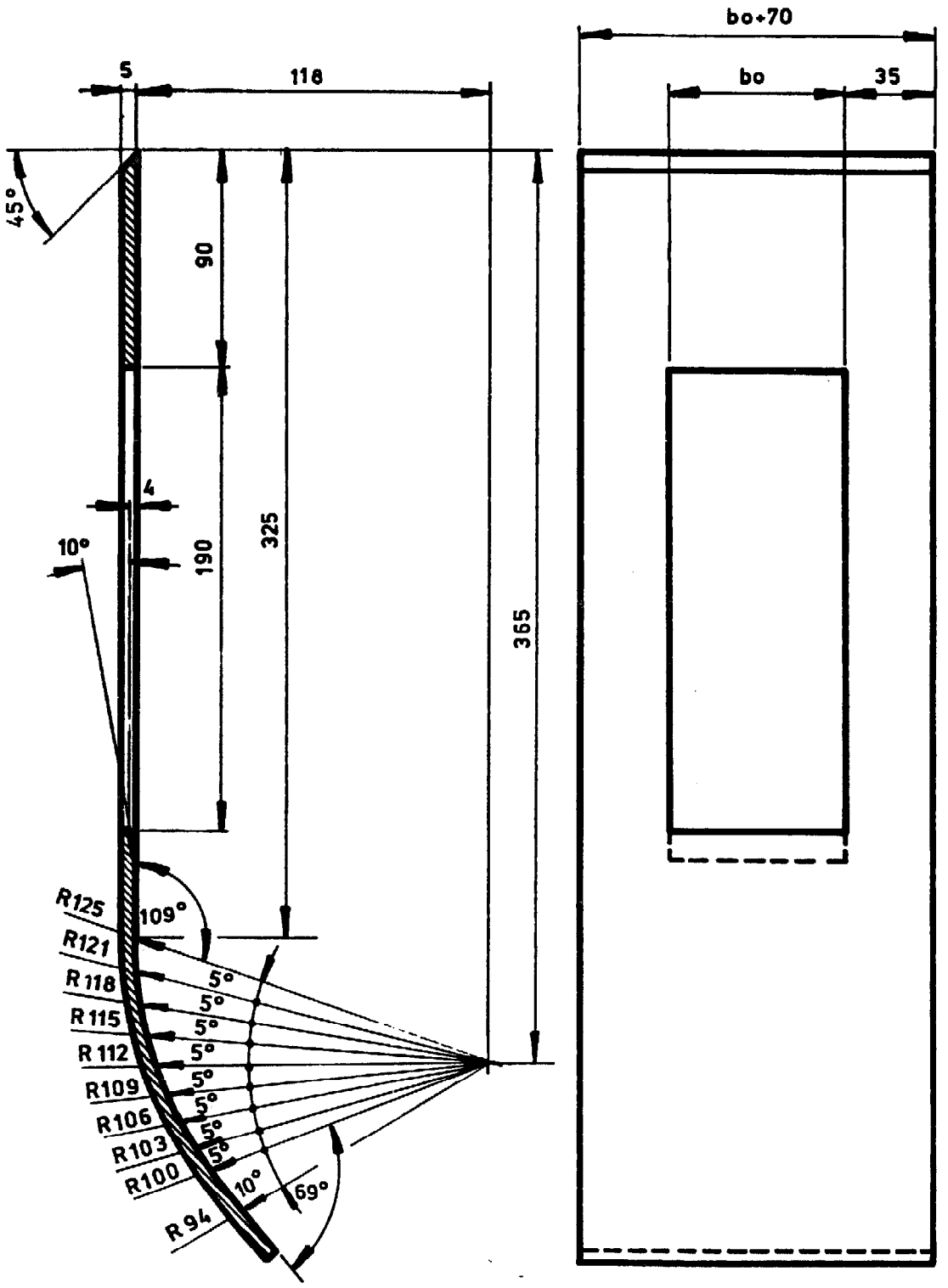
1:2,5(1:1)



INLET TOP ASSEMBLY

T3/06/01 | S17

1 : 2



M.S.PLATE

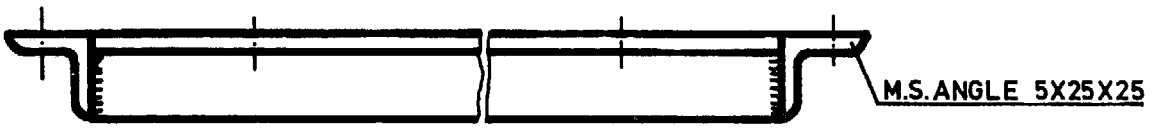
1.PC

STRAIGHT LENGTH 450

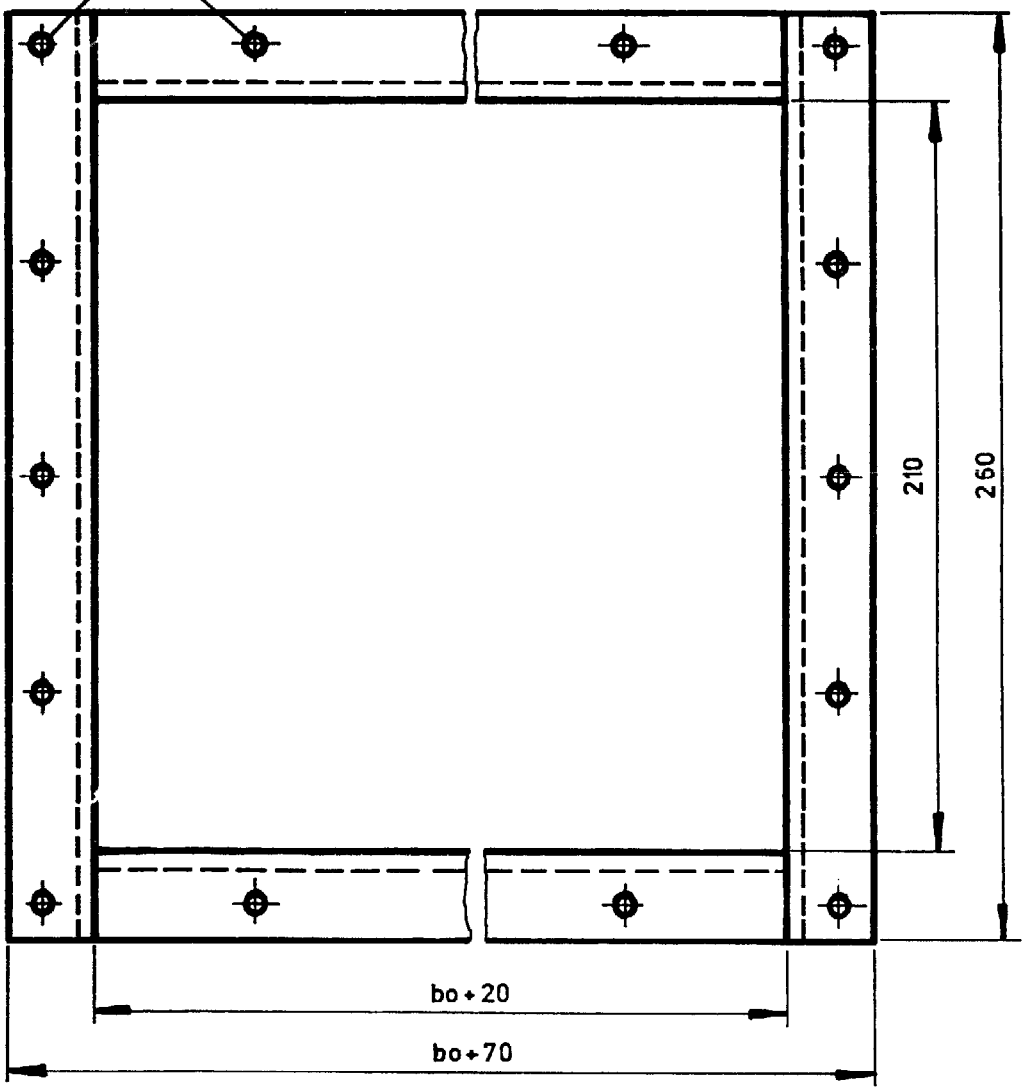
INLET TOP GUIDE

T3/06/01-1 | S18

1:25



DRILL THESE HOLES TOGETHER WITH
POS.T3/06/01-3



1.PC

HATCH DOOR FRAME

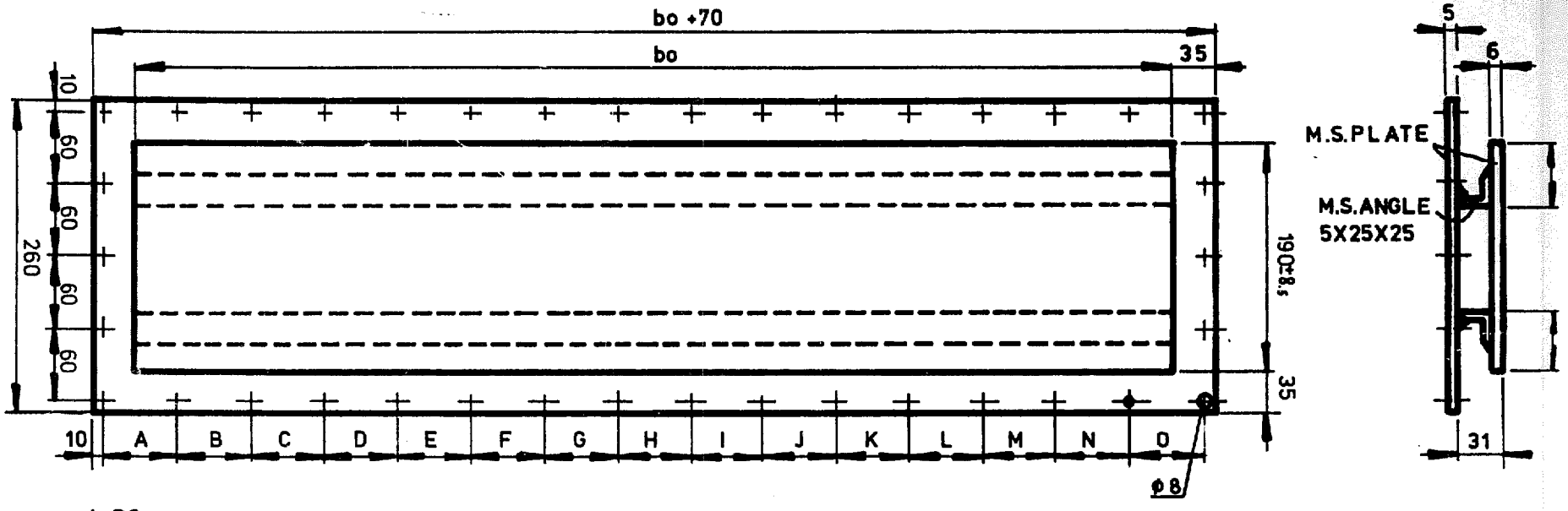
T3/06/01-2 | S19

1:2

2.82

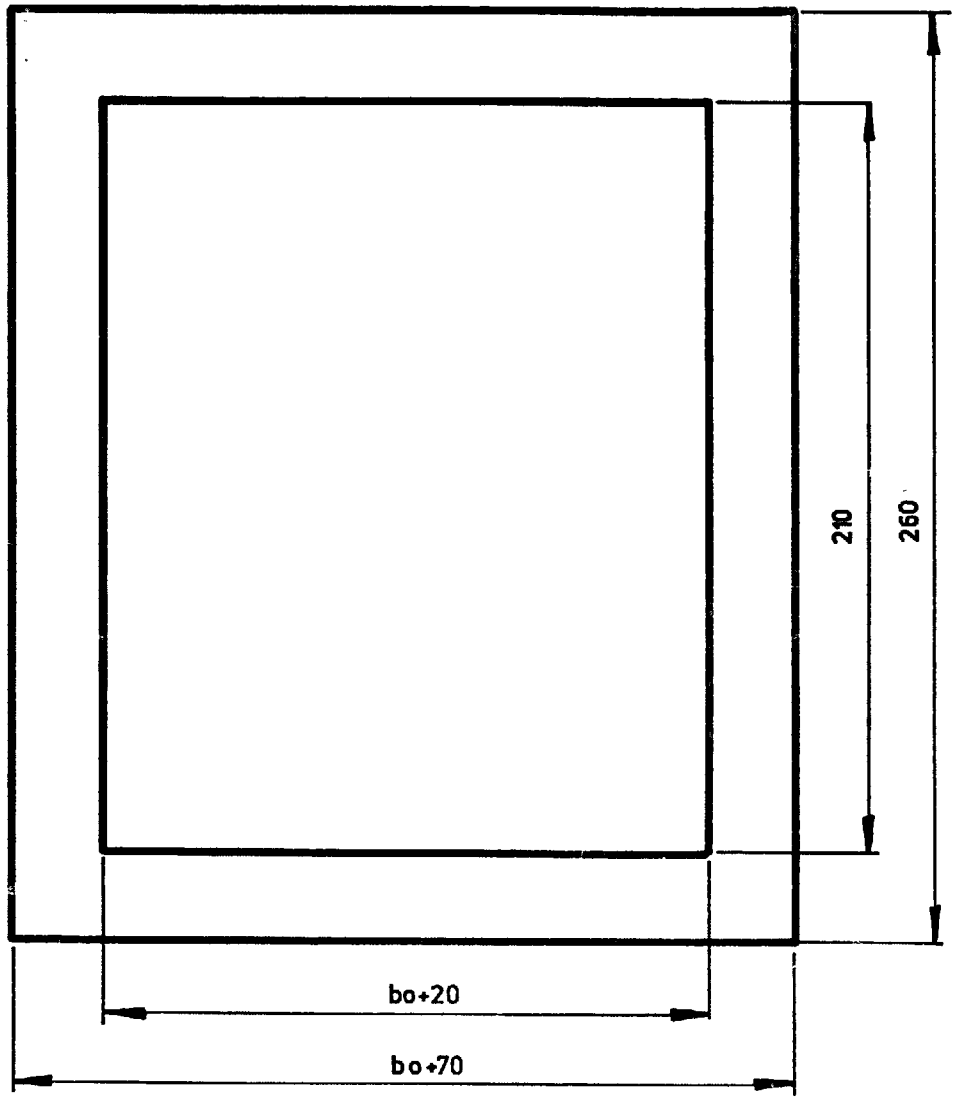
HATCH DOOR

T3/06/01-3 S20



1. PC

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
bo 50	50	50													
bo 70	40	40	40												
bo 90	47	46	47												
bo120	43	42	42	43											
bo160	42	42	42	42	42										
bo220	54	54	54	54	54										
bo290	57	57	56	56	57	57									
bo390	63	63	63	63	63	63	63								
bo520	64	63	63	63	64	63	63	63	64						
bo 690	68	67	67	67	67	68	67	67	67	67	68				
bo920	65	65	65	65	65	64	64	64	64	64	65	65	65	65	65



RUBBER 2MM

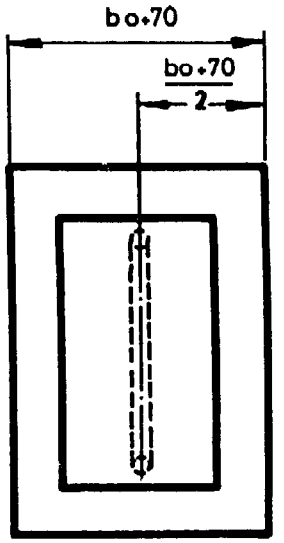
1.PC

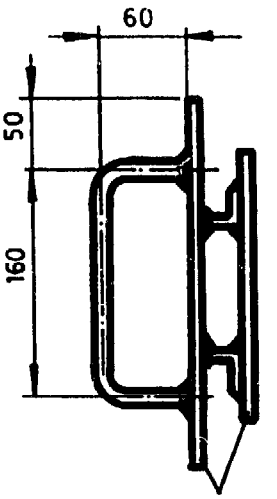
HATCH DOOR GASKET

T3/06/01-4

S21

1:2

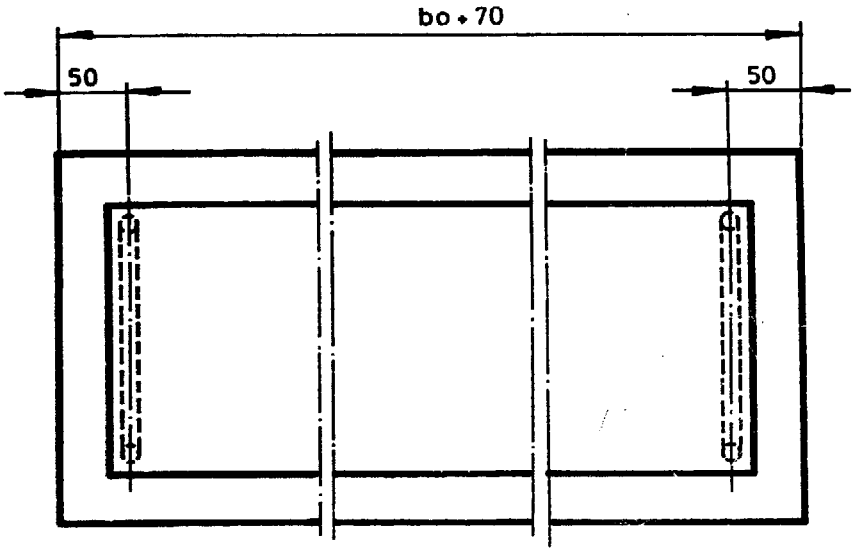


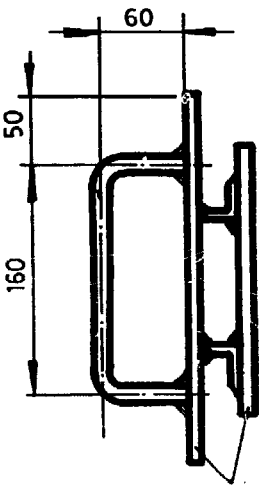


T3/06/01-3

M.S.ROD ϕ 1/2" X295
1.PC

VALID FOR	bo-50	bo-70	bo-90	bo-120	bo-160





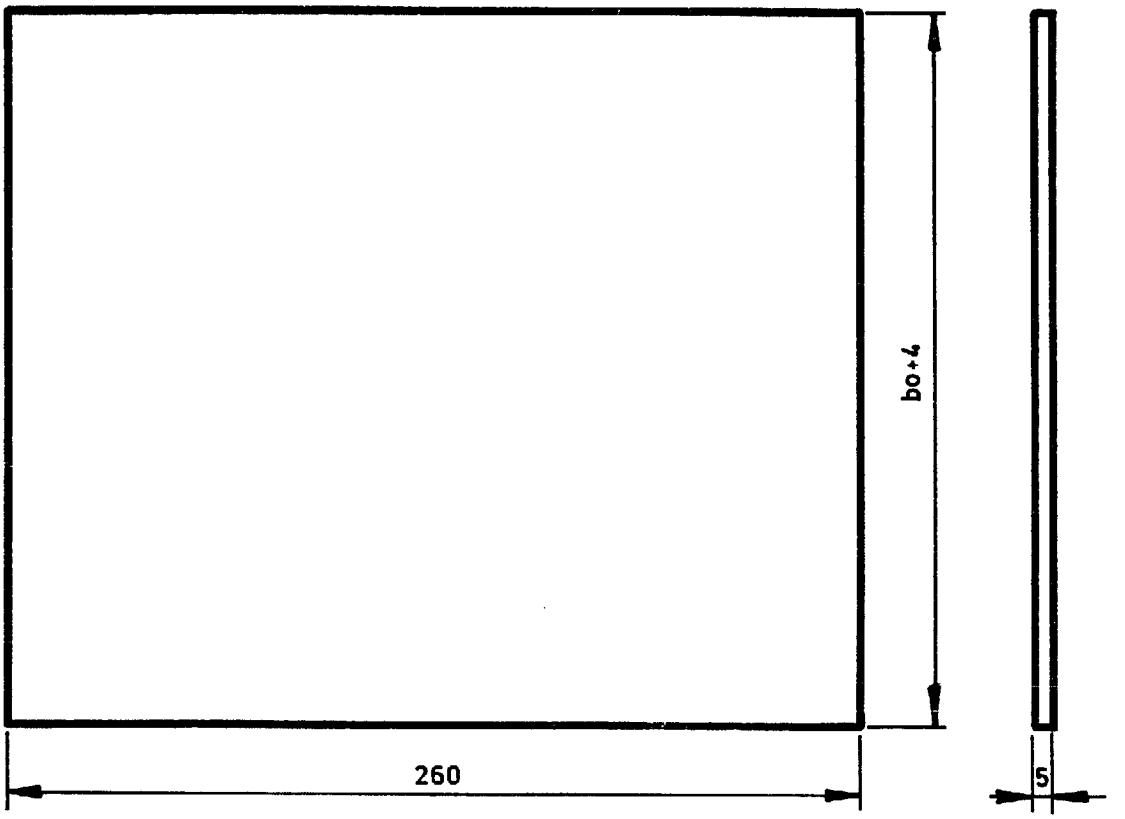
T3/06/01-3

M.S.ROD ϕ 1/2" X 295
2.PCS

VALID FOR	bo-220	bo-290	bo-390	bo-520	bo-690	bo-920

HANDLE

T3/06/01,5 | S22



M.S.PLATE

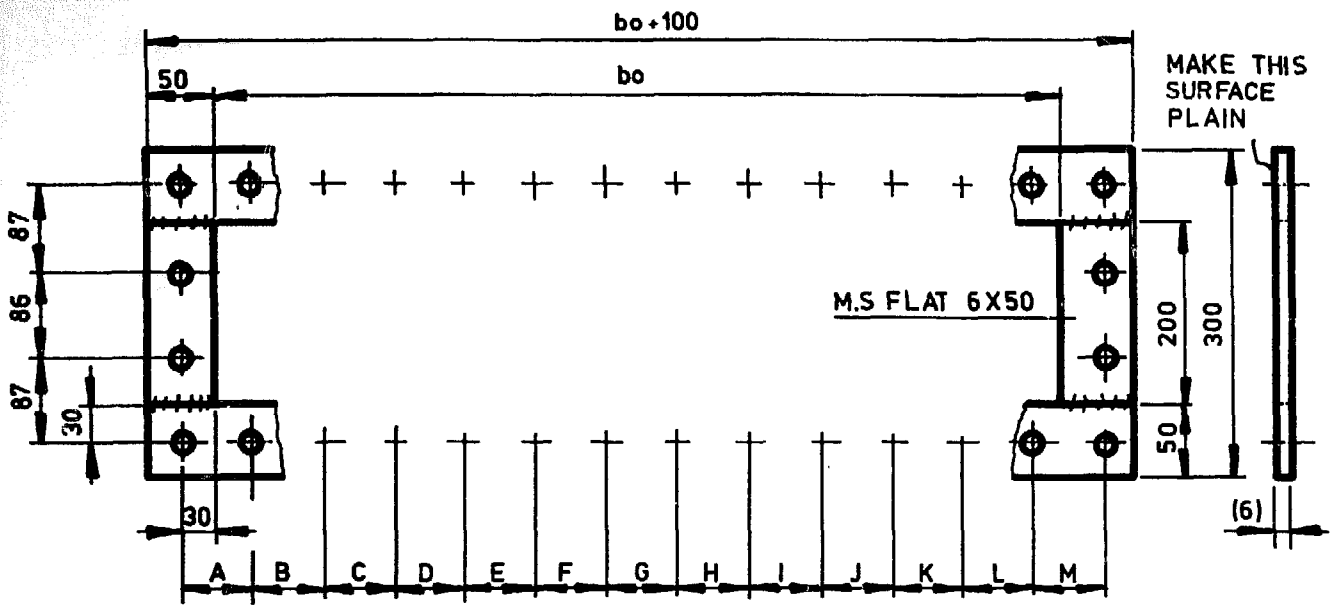
1.NO

INLET BOTTOM PLATE

T3/06/02

S23

1:2

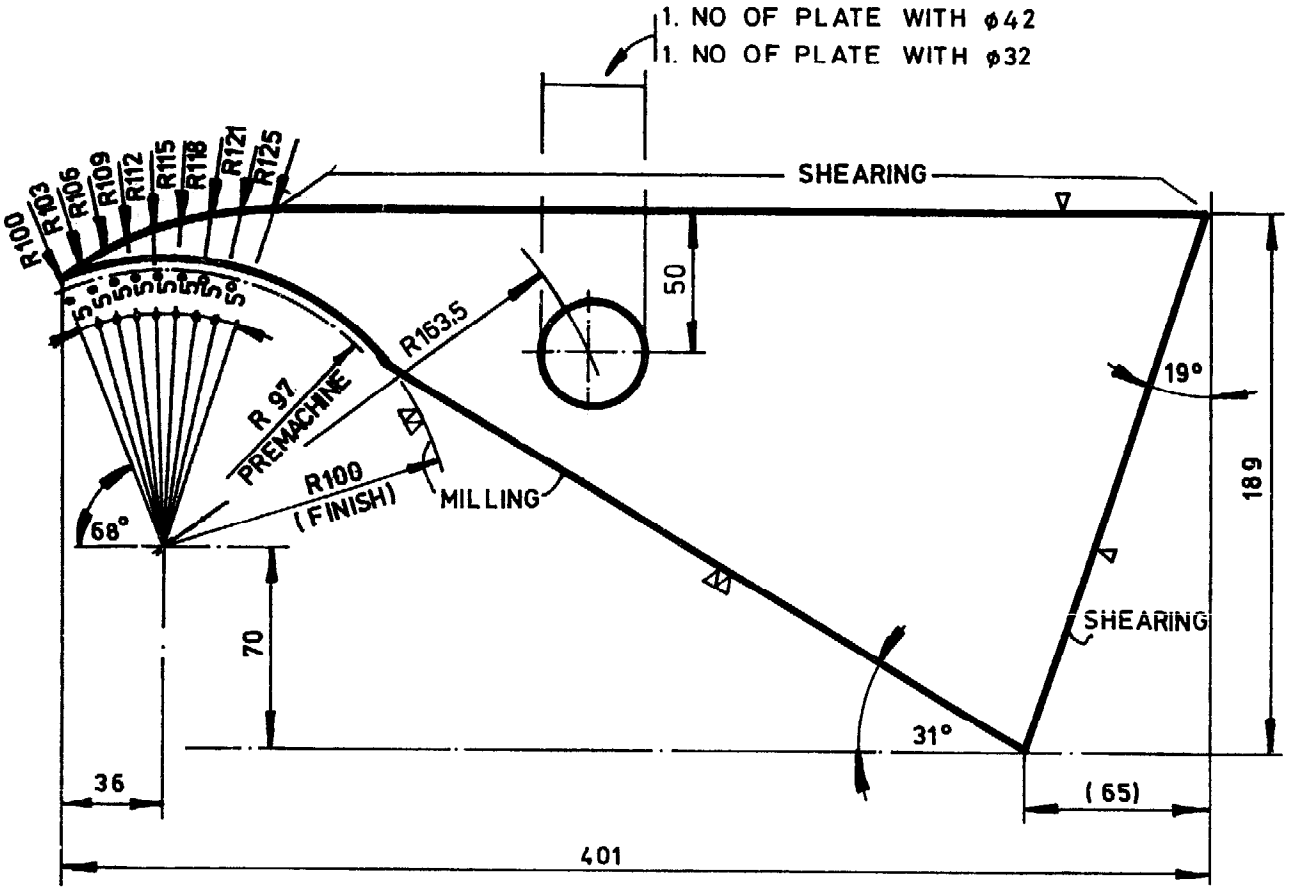


2 PCS

	A	B	C	D	E	F	G	H	I	J	K	L	M
bo 50	55	55											
bo 70	65	65											
bo 90	75	75											
bo 120	60	60	60										
bo 160	75	70	75										
bo 220	70	70	70	70									
bo 290	70	70	70	70	70								
bo 390	75	75	75	75	75	75							
bo 520	73	73	72	72	72	72	73	73					
bo 690	75	75	75	75	75	75	75	75	75	75			
bo 920	76	76	75	75	75	75	76	75	75	75	75	76	76

INLET FLANGE

T3/06/03 | S24



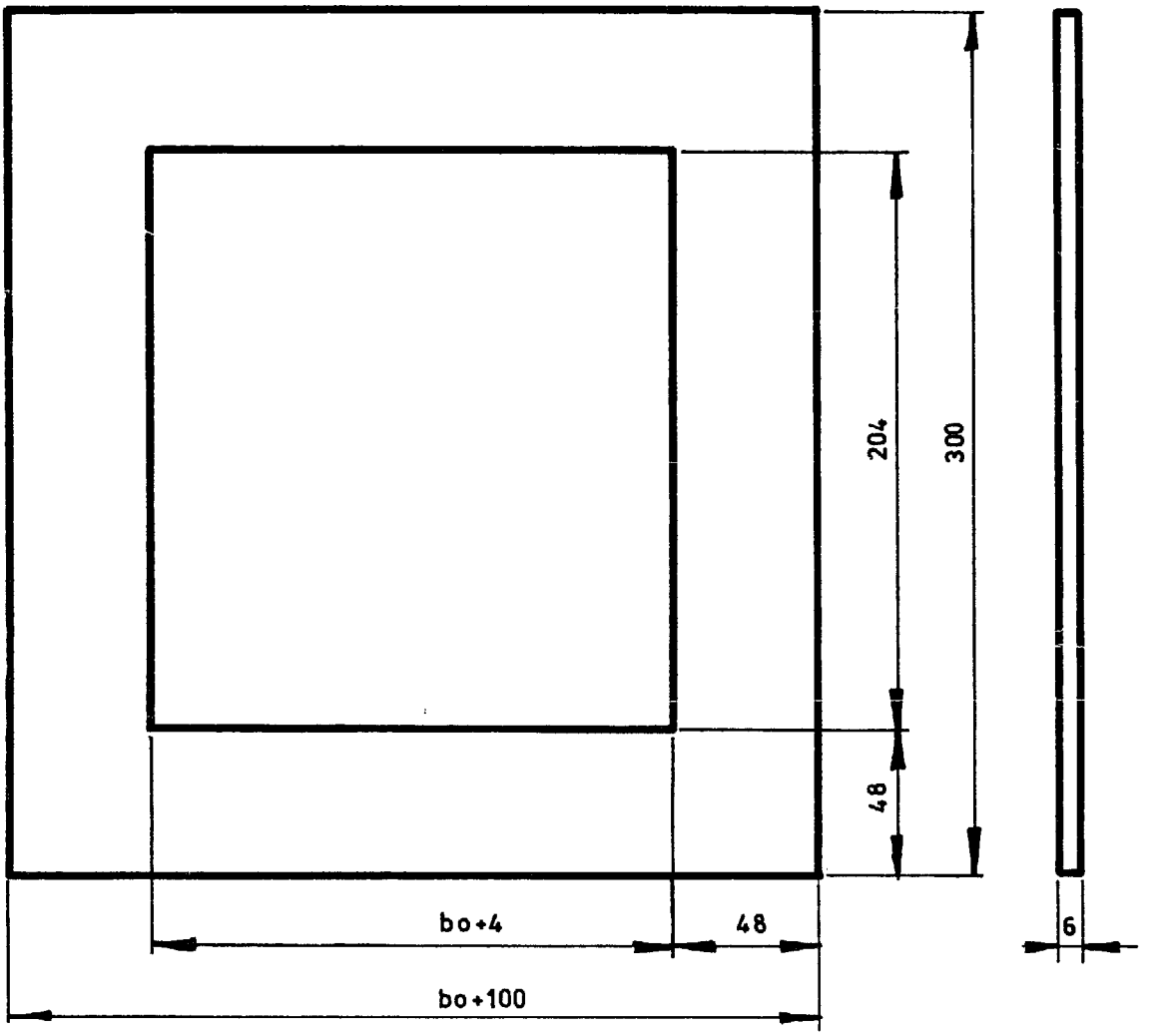
M.S.PLATE 5MM

2.NOS

INLET SIDE PLATE

T3/06/04 | S25

1:2.5



RUBBER SHEET

1.PC

INLET GASKET

T3/07/00 | S26

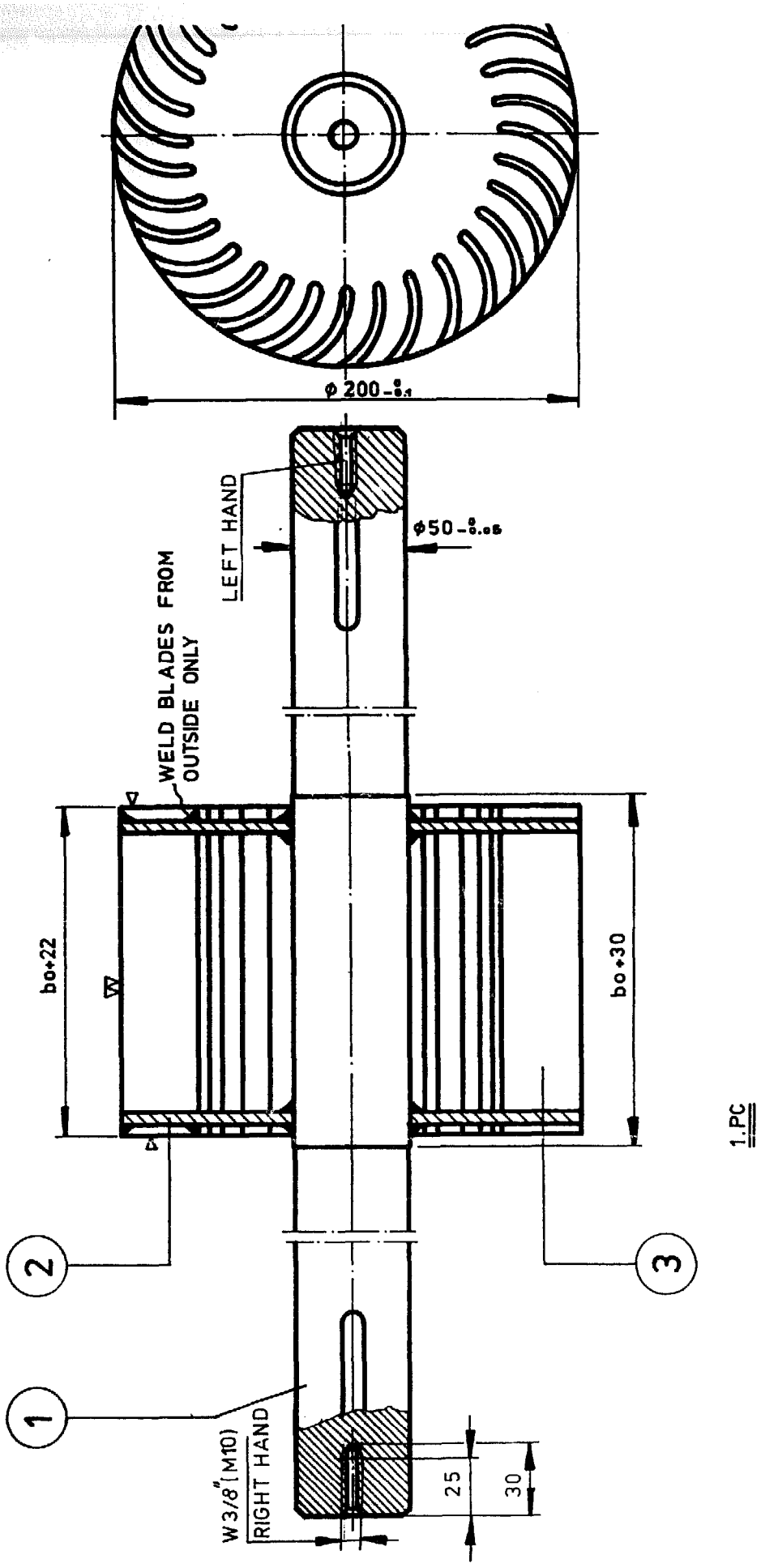
1	1	ROTOR SHAFT	T3/08/01	M.S.ROD ϕ 2" (50,8) X bo+570
2		ROTOR DISC	T3/08/ 02	M.S.SHEET 4MM X 205X205
3	32	BLADE	T3/08/ 03	M.S .SHEET 2,5MM X 49Xbo+30

ROTOR ASSEMBLY

T3/08/00

S27

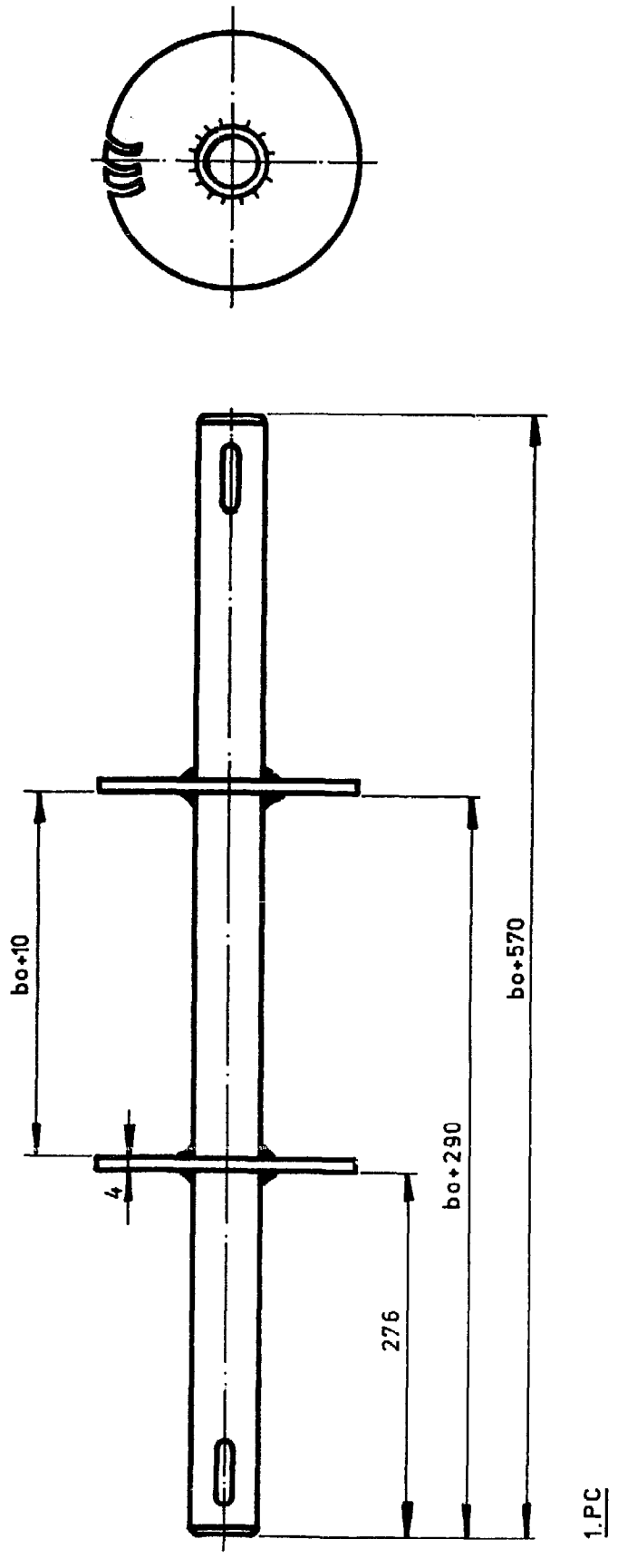
PART LIST



ROTOR ASSEMBLY

T3/08/00 | S28

1:2.5



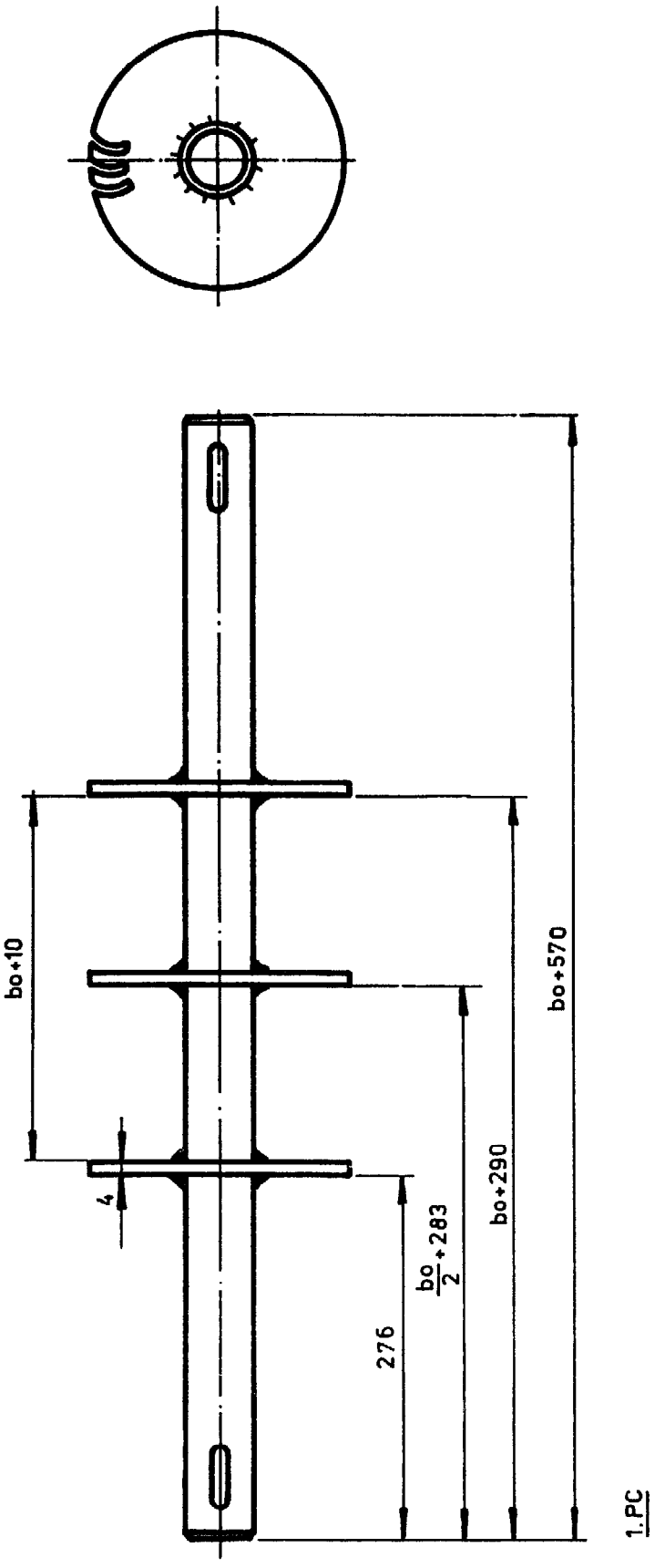
1.PC

ROTOR DISC ARRANGEMENT 'A'

1:5

T3/08/00

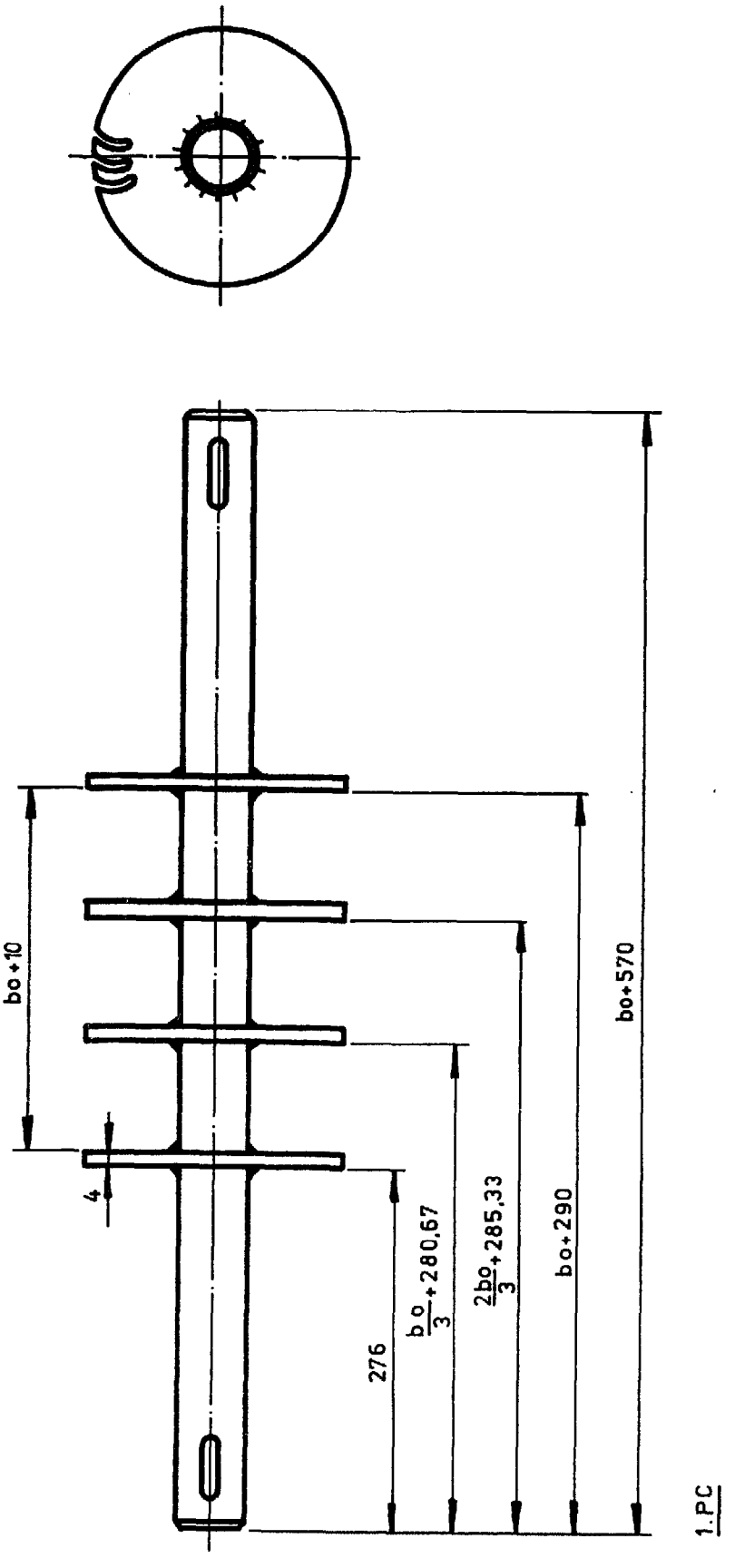
S29



ROTOR DISC ARRANGEMENT 'B'

1:5

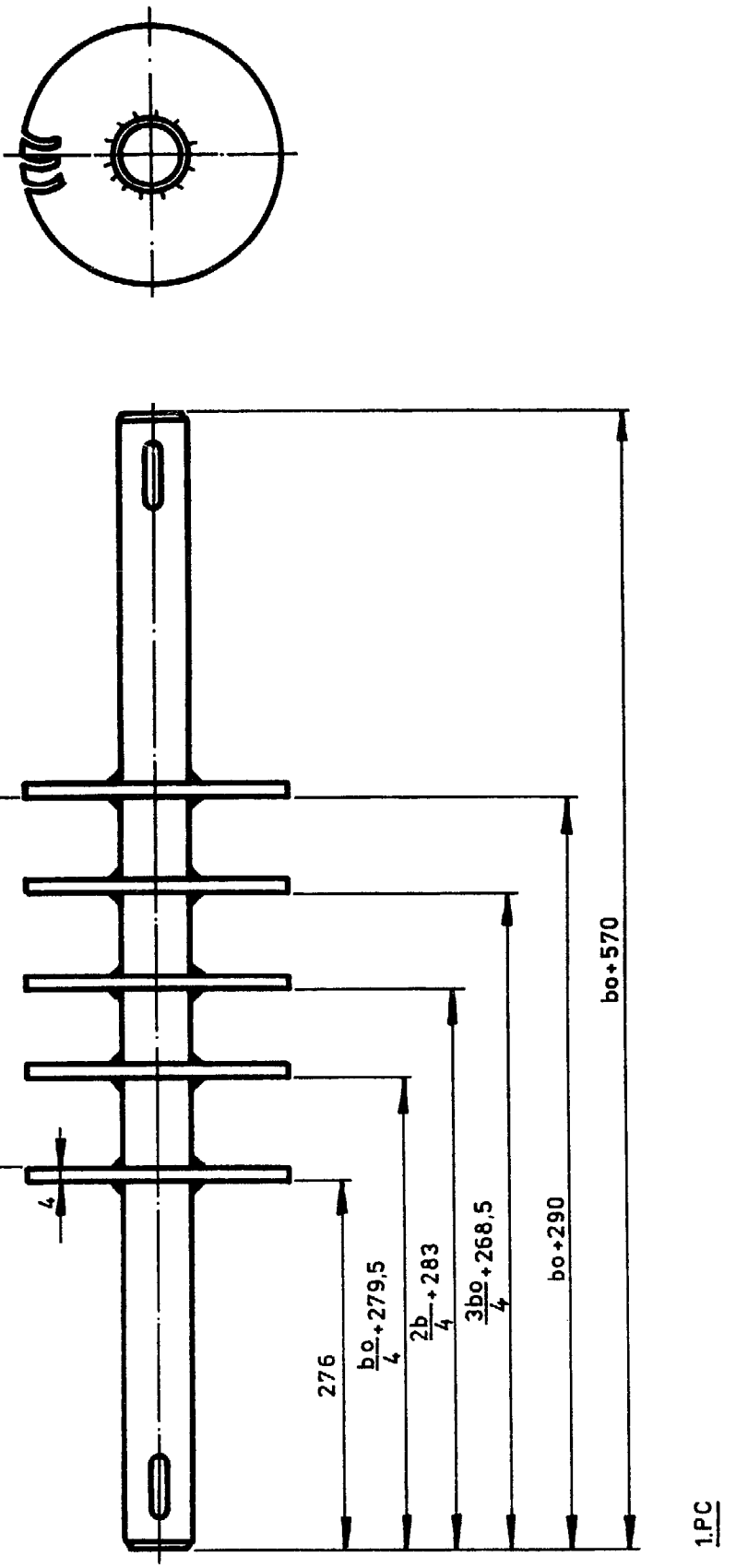
T3/08/00 | S30



ROTOR DISC ARRANGEMET 'C'

1:5

T3/08/00 | S31

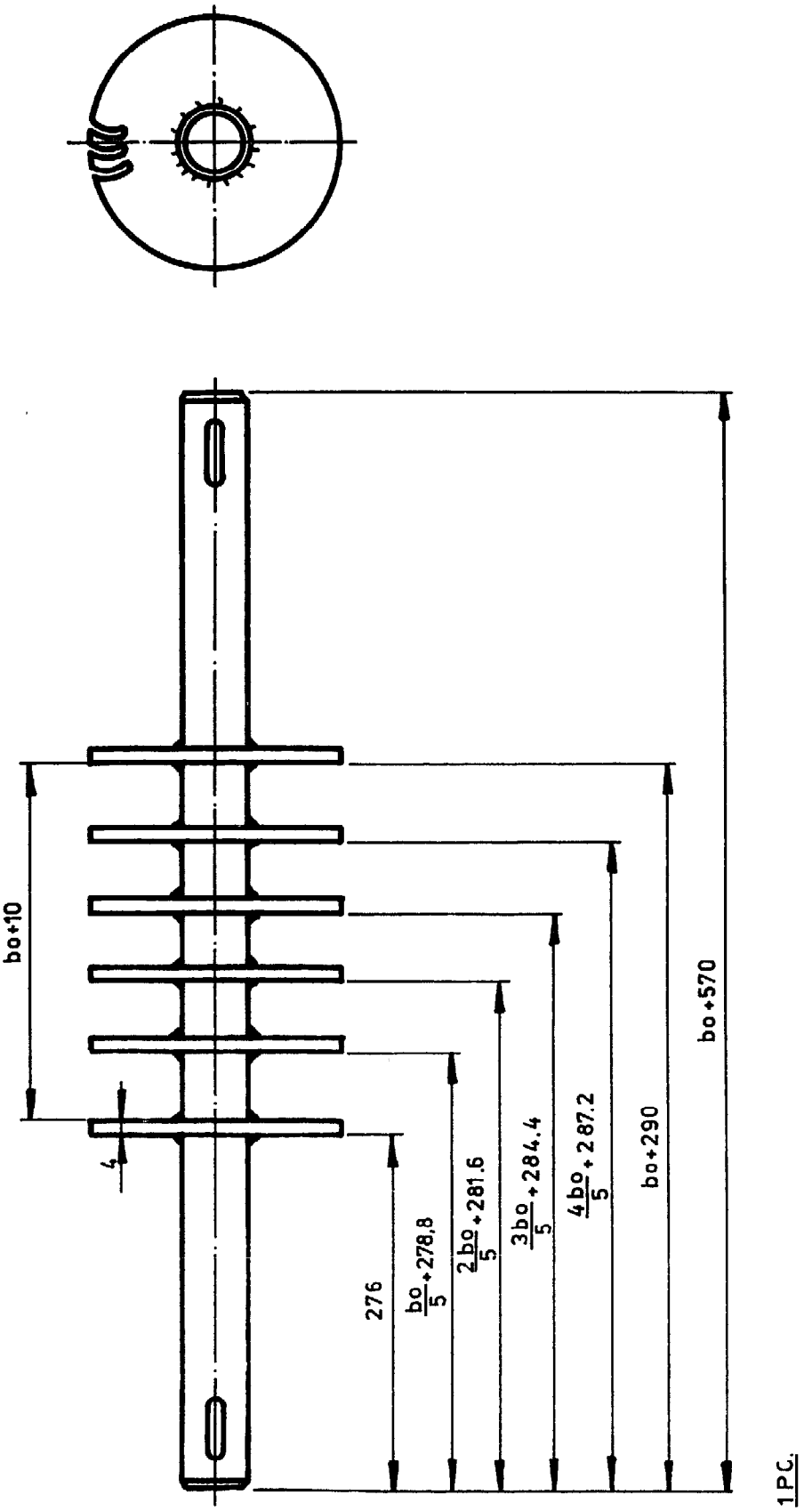


1.PC

ROTOR DISC ARRANGEMENT 'D'

1:5

T3/08/00 | S32



1 PC.

ROTOR DISC ARRANGEMENT 'E'

1:5

T3/08/00

S33

1:2

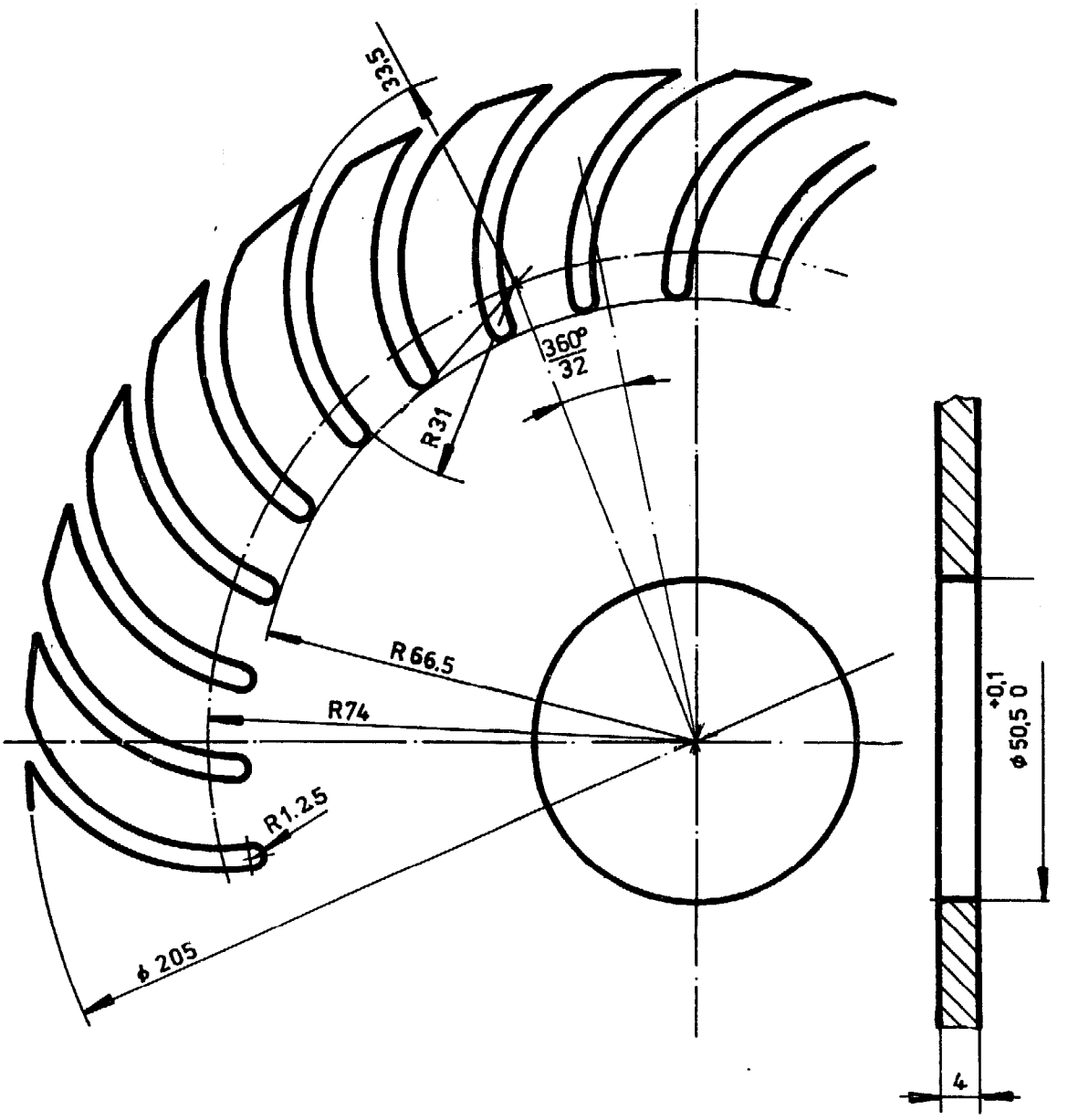
ROTOR SHAFT (PREMACHINED)

T3/08/01 S34

M.S.ROD 2"(50.8)

X . DIMENSION ACCORDING TO PULLEY USED

1.PC



M.S.PLATE

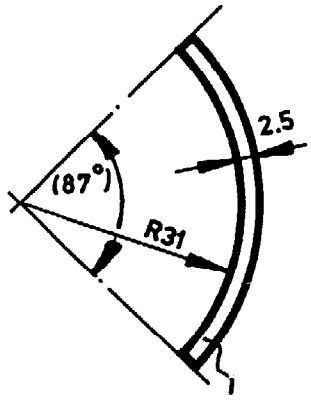
PC

ROTOR DISC

T3/08/02

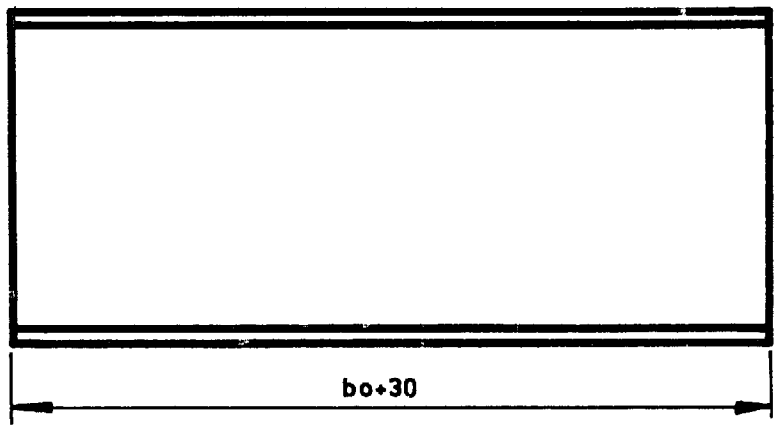
S35

1:1

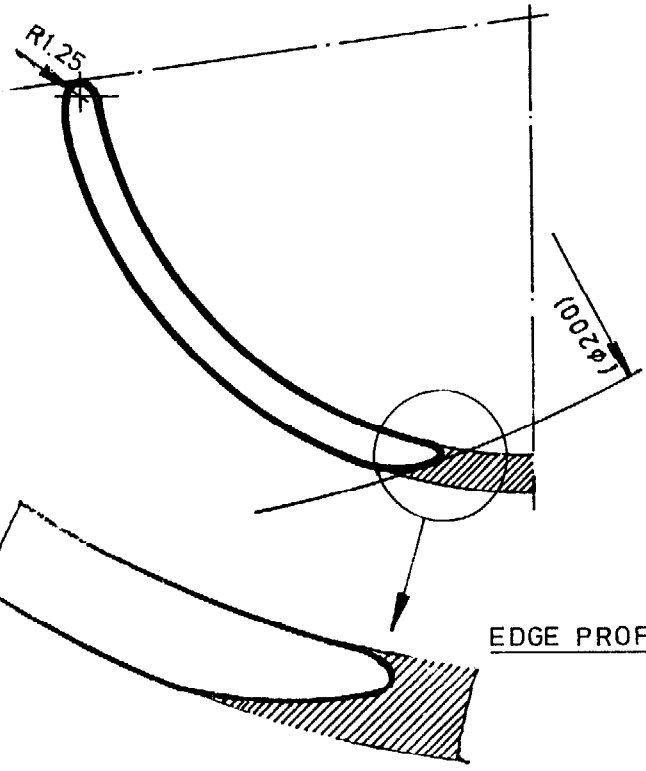


STRAIGHT LENGTH

= 49



EDGE PROFILE (2 : 1)



M.S.SHEET

32.PCS

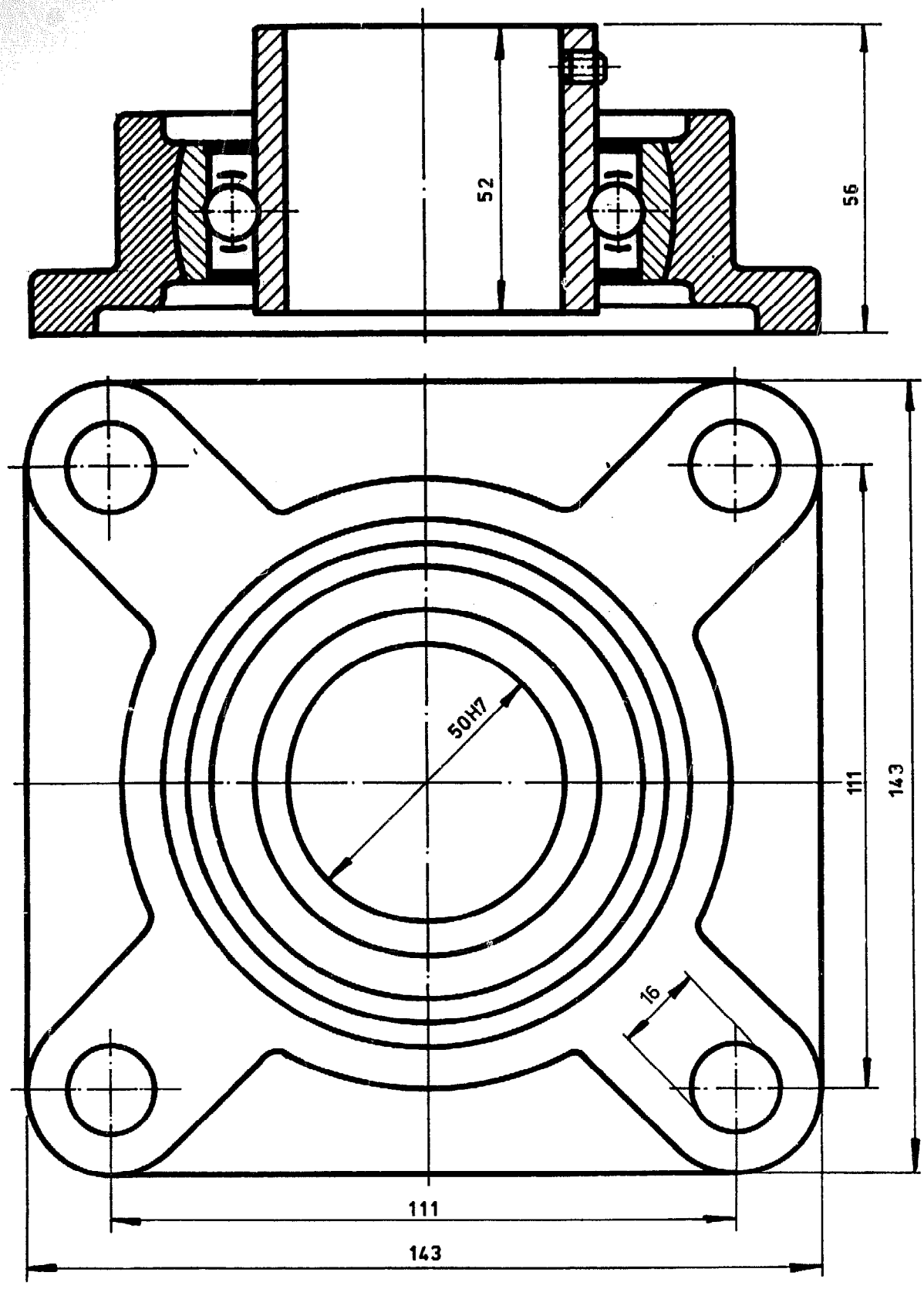
EDGE PROFILE (5:1)

BLADE

1:1 (2:1) (5:1)

T8/08/03

S36

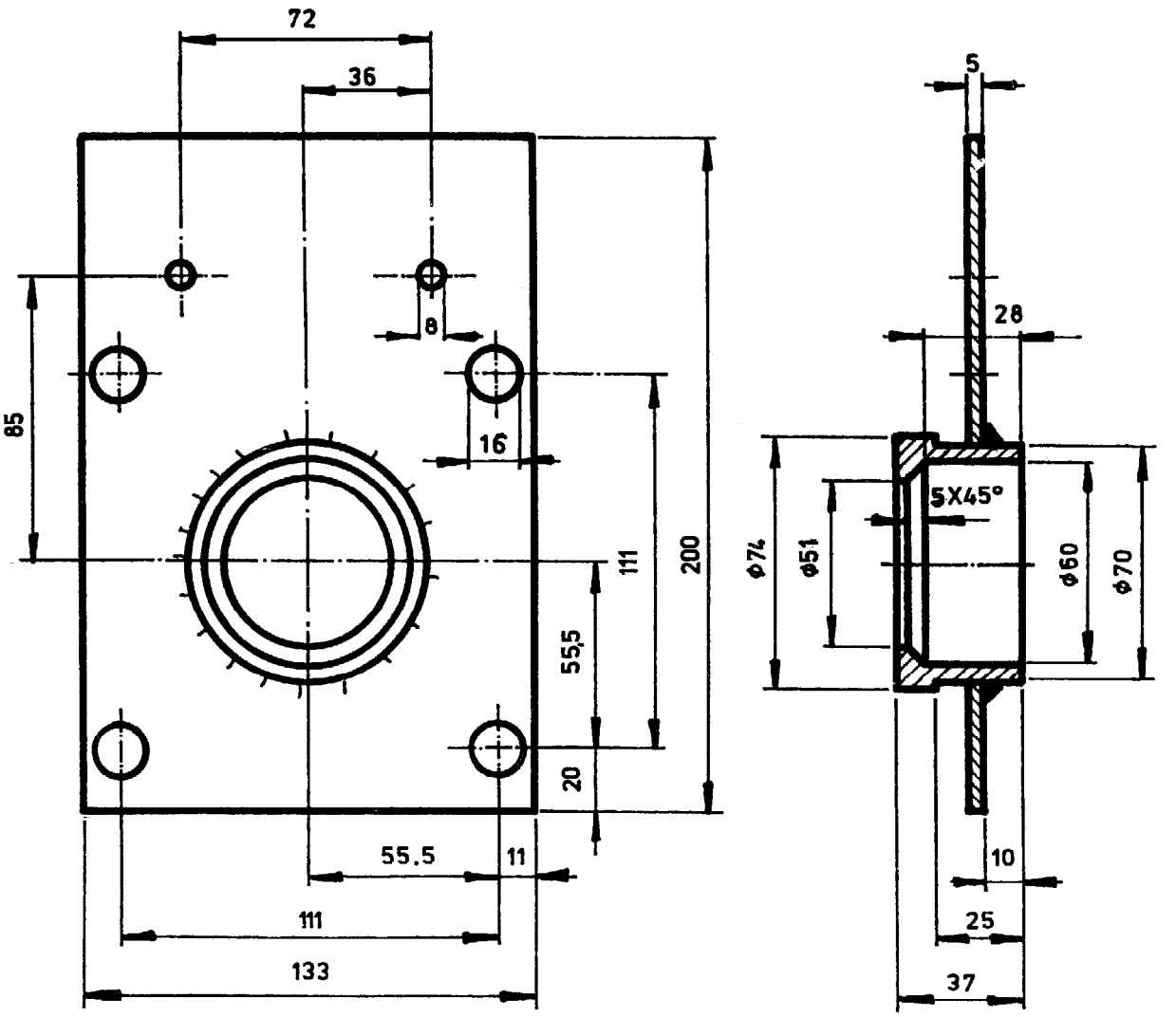


2 PCS BEARING NUMBER FYH F210J UCS10

ROTOR BEARING

T3/09/00 | S37

1:1



M.S.ROD / PLATE

2.PCS

NOTE.-USE JIG NO. 02
TO DRILL HOLES (ϕ8, ϕ16)

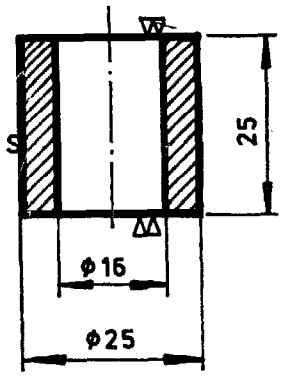
-DO BORING OF ϕ51 AND ϕ60
AFTER WELDING TO FLAGE.

STUFFING BOX

T3/10/00

S3E

1:2



M.S.ROD

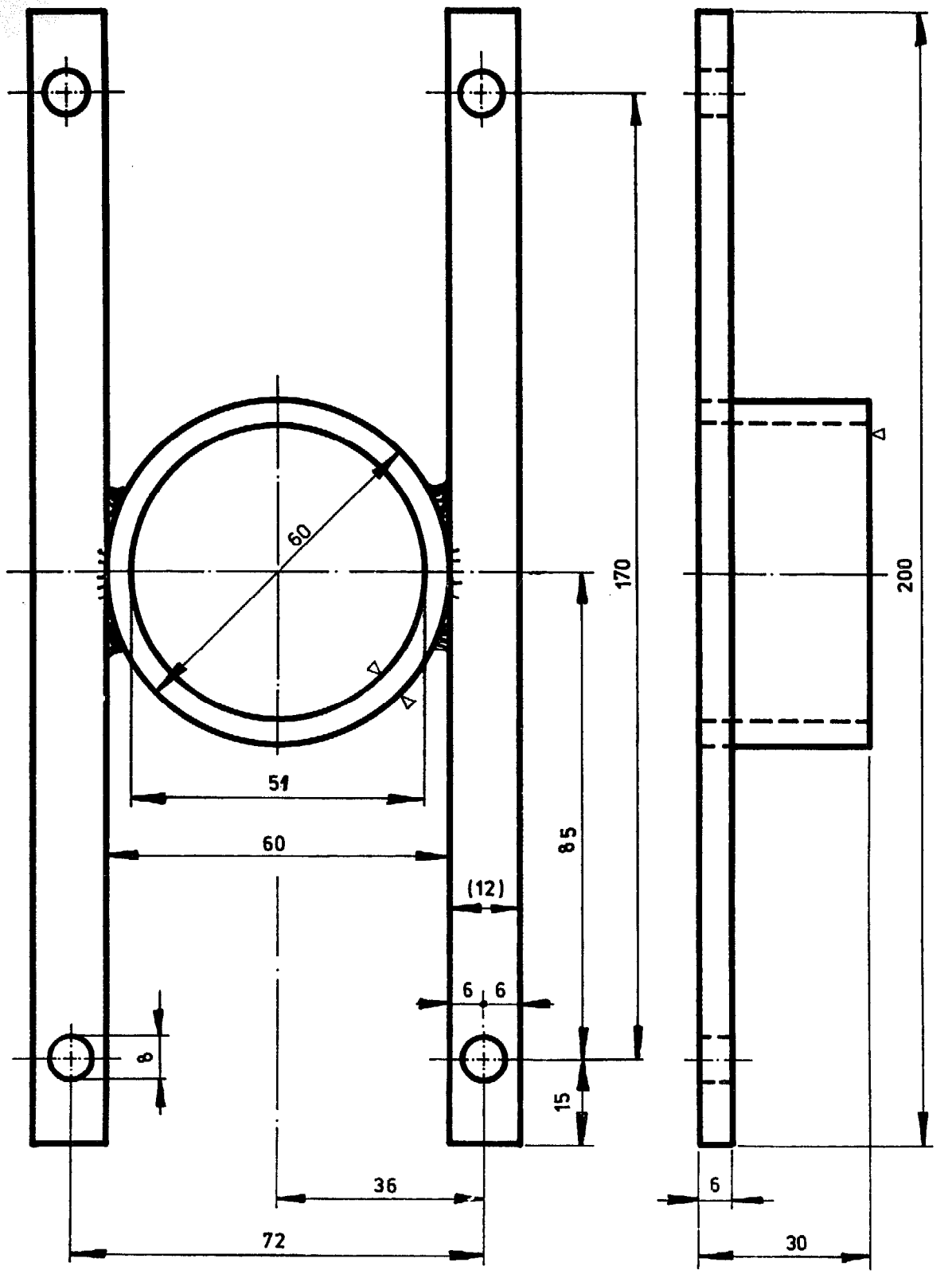
8.PCS

SPACER

T3/11/00

S39

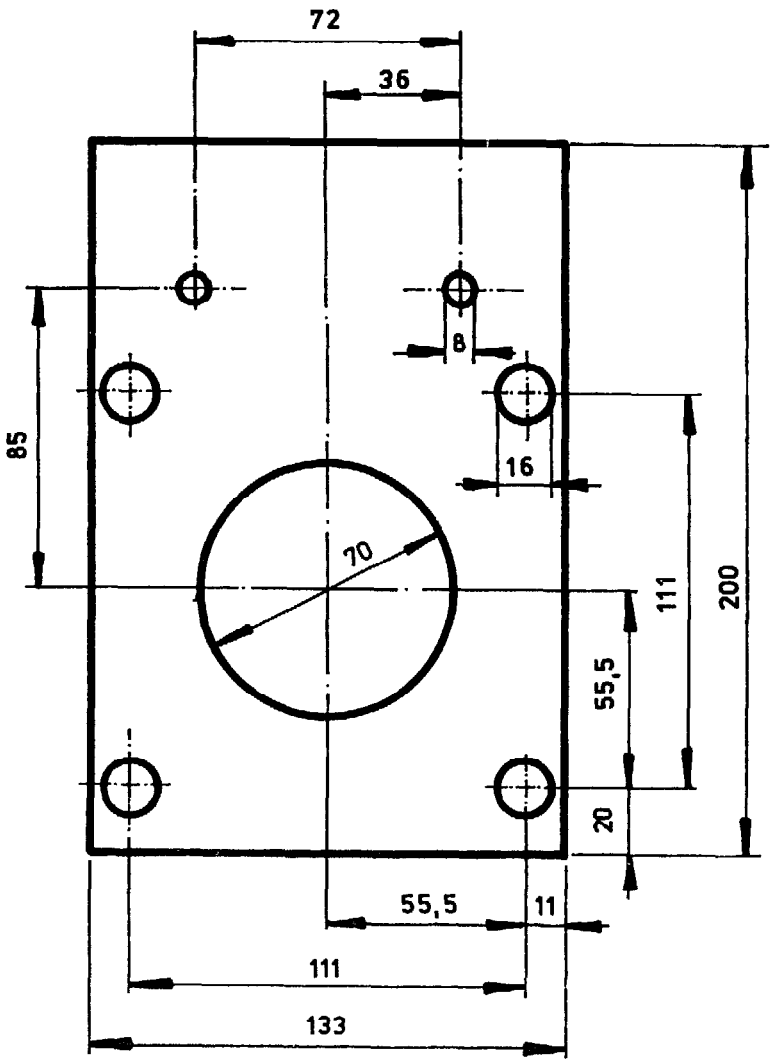
1:1

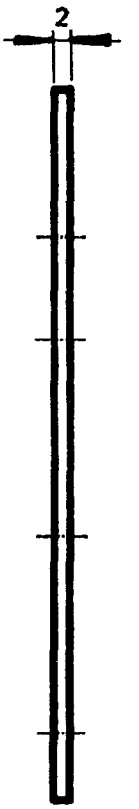


PRESS RING

T3/12/00 | S40

1:1





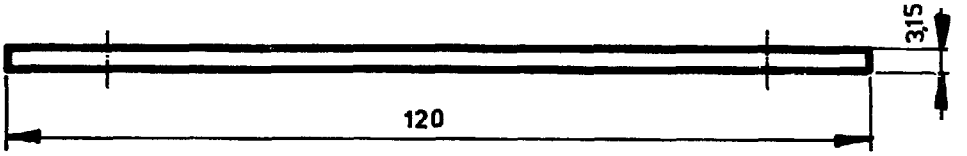
RUBBER 2MM

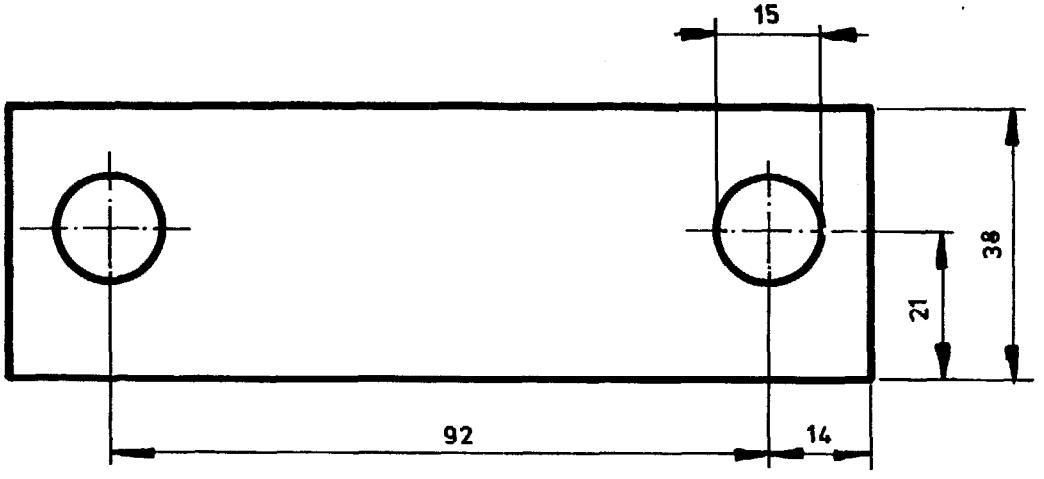
2 PCS

STUFFING PLATE GASKET T3/13/00

S41

1:2





M.S.FLAT

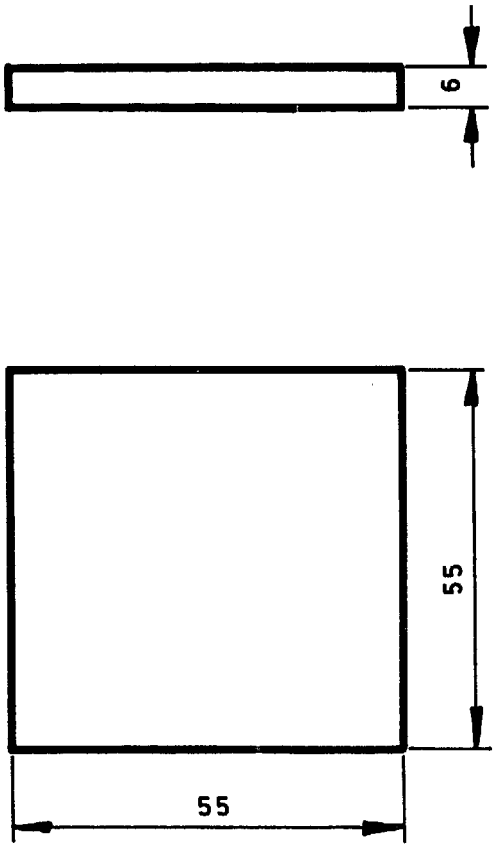
2.PCS

SEALING PLATE

T3/14/00

S42

1:1



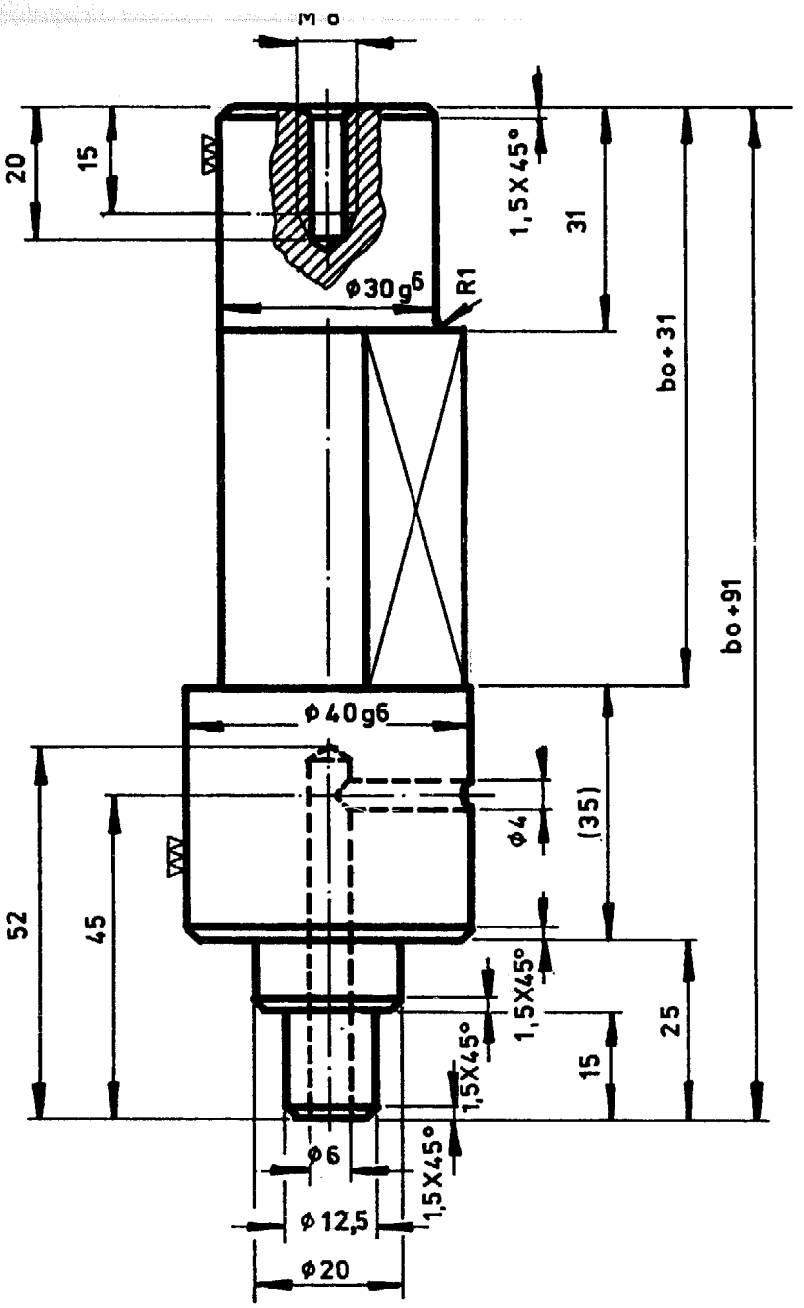
RUBBER SHEET

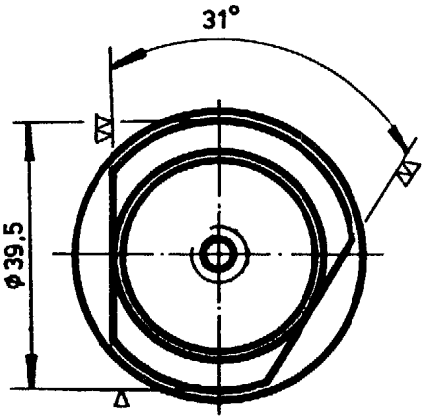
2.PCS

SEALING PAD

T3/15/00 | S43

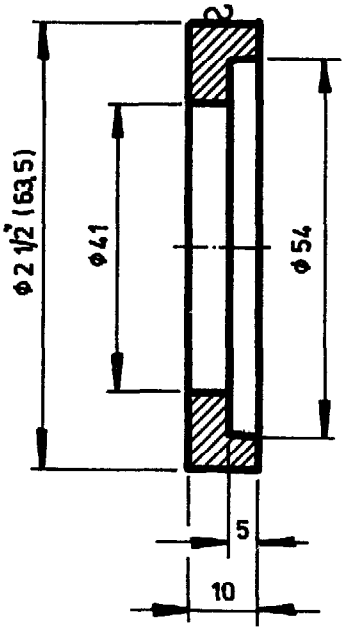
1:1





BUTTERFLY VALVE SHAFT T3/16/00 | S44

1:1



MS.ROD

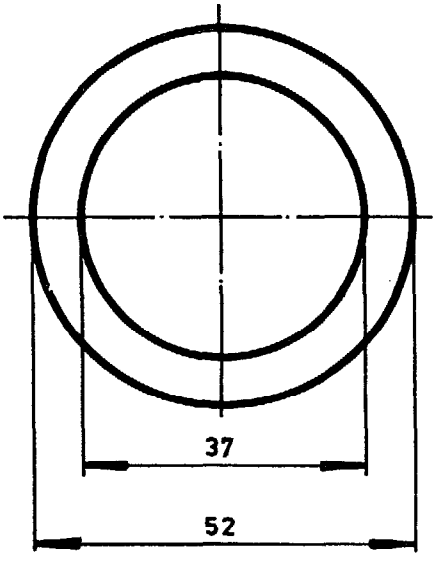
1.PC

CUP BUSH

T3717/00

S 45

1:1



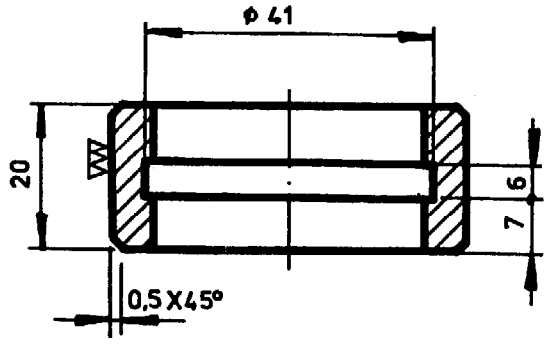
RUBBER 6MM

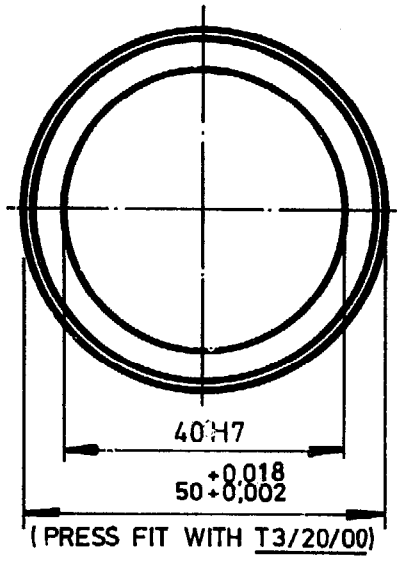
2.PCS

SEALING RING

T3/18/00 | S46

1:1





(PRESS FIT WITH T3/20/00)

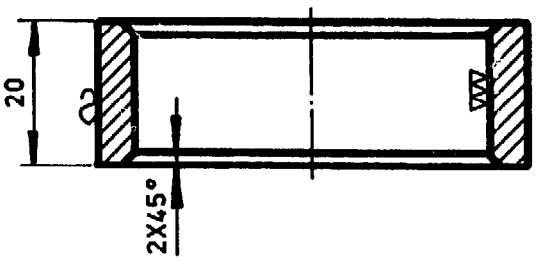
BRASS ROD 2" (50,8)

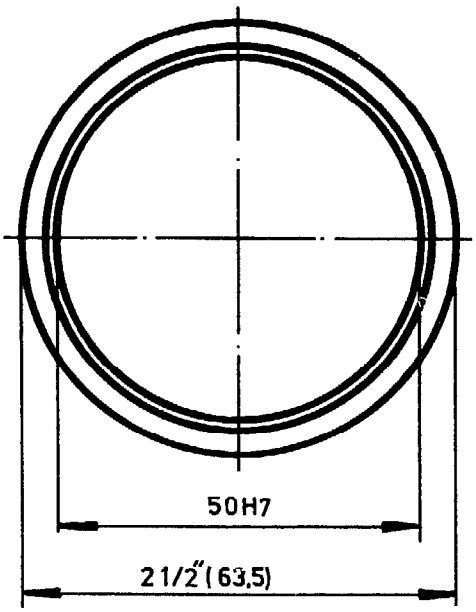
1 PC

PIVOTAL BUSH '1'

T3/19/00 | S47

1:1





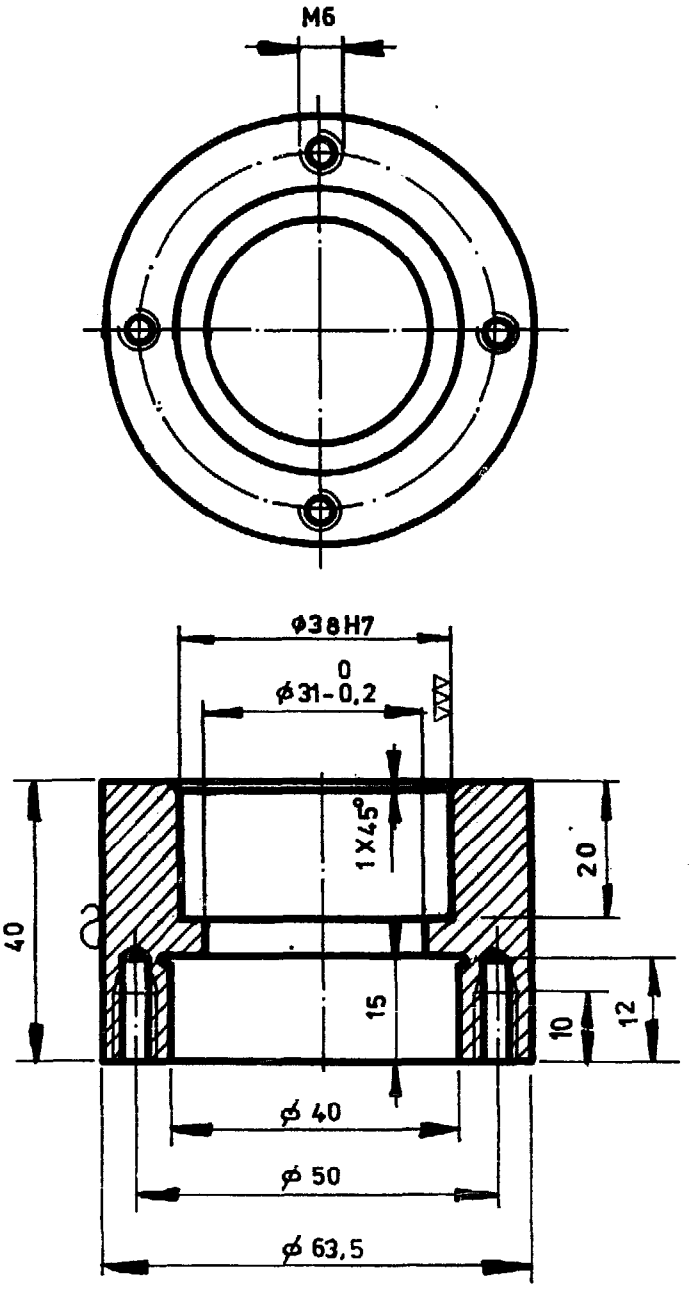
M.S.ROD

1.PC

BUSH CASING '1'

T3/20/00 S48

1:1



M.S. ROD ϕ 2 1/2" (63,5)

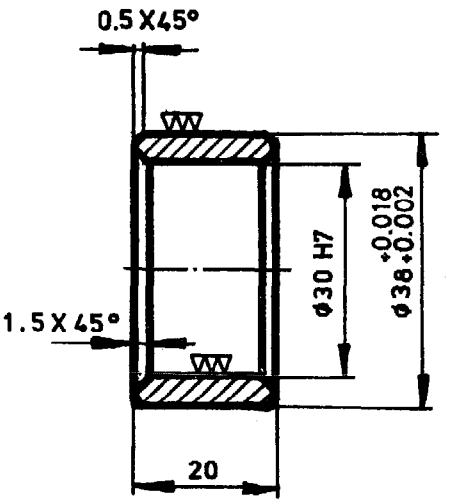
1. PC

BUSH CASING '2'

T3/21/00

S49

1:1



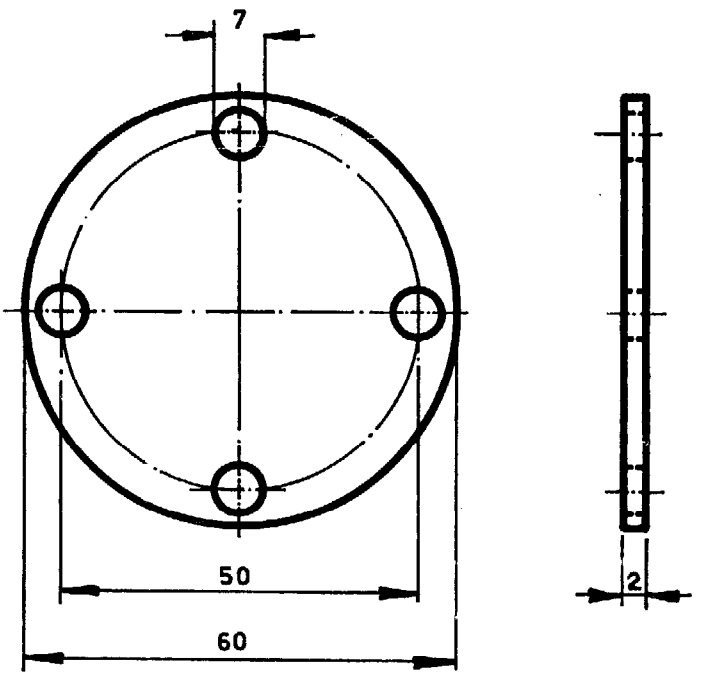
BRASS ROD

1.PC

PIVOTAL BUSH-2

T3/22/00 | S50

1:1



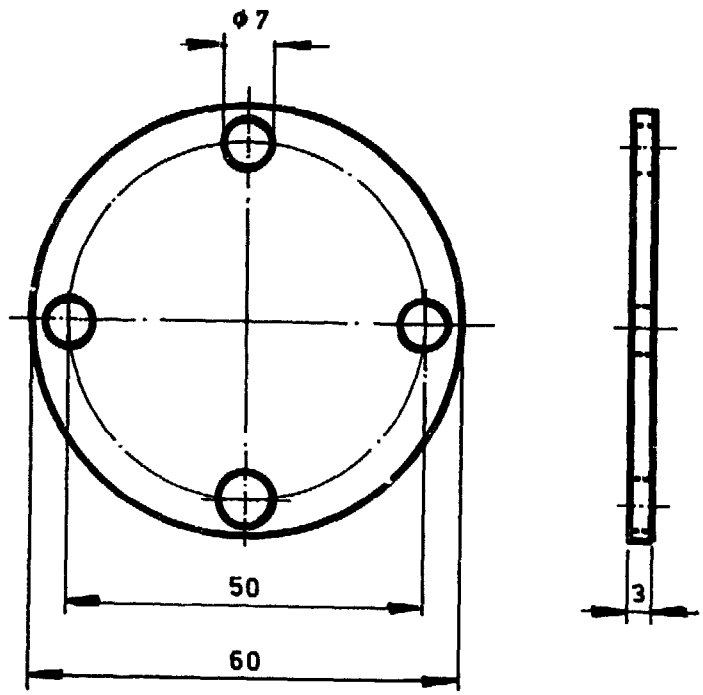
RUBBER SHEET 2MM

1.PC

GASKET

T3/23/00 | S51

1:1



M.S. SHEET

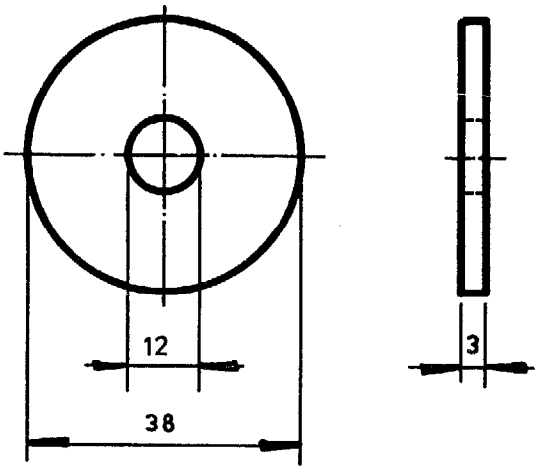
1.PC

COVER

1:1

T3/24/00

S52



M.S. SHEET

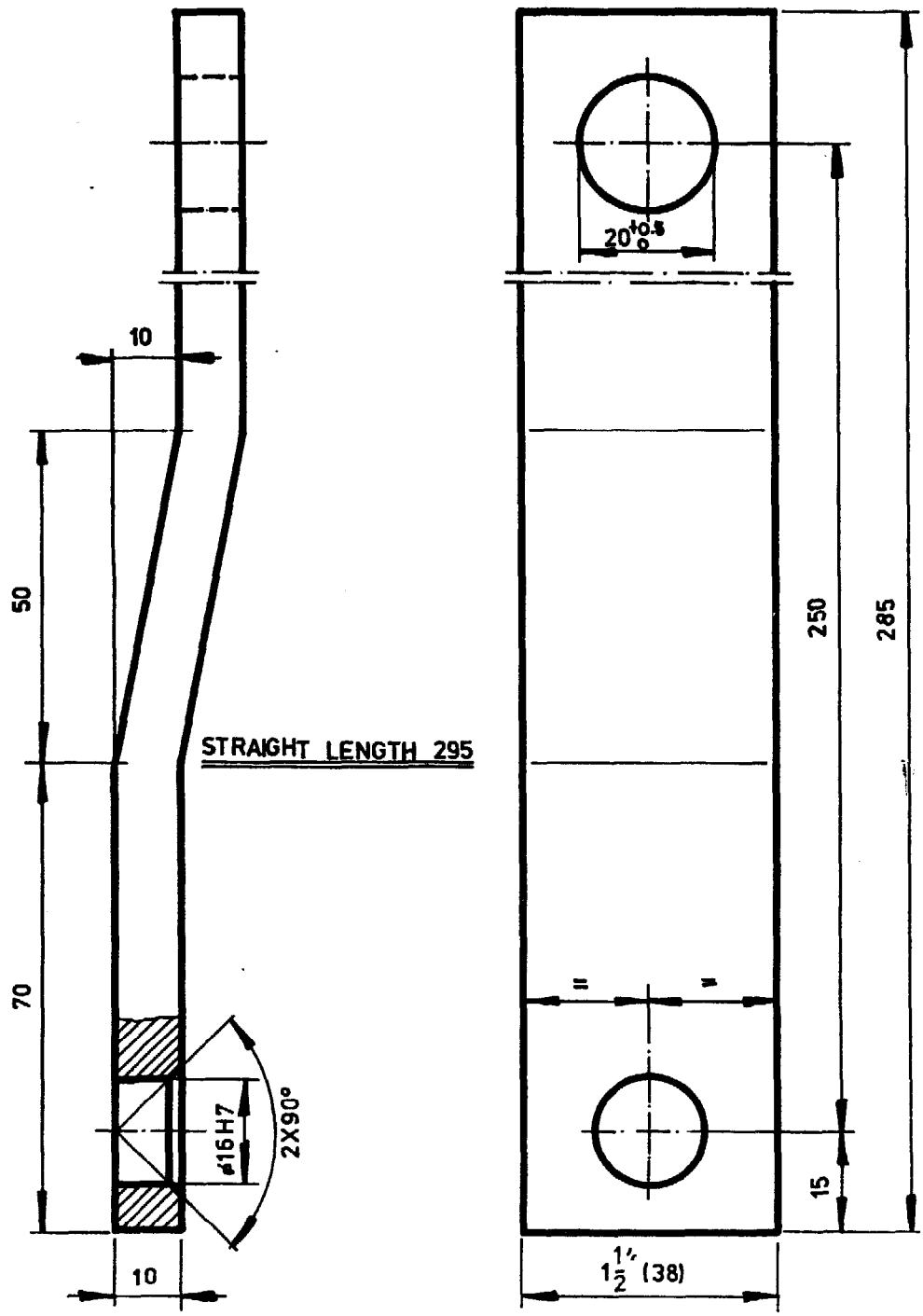
1. PC

WASHER

T3/25/00

S53

1:1

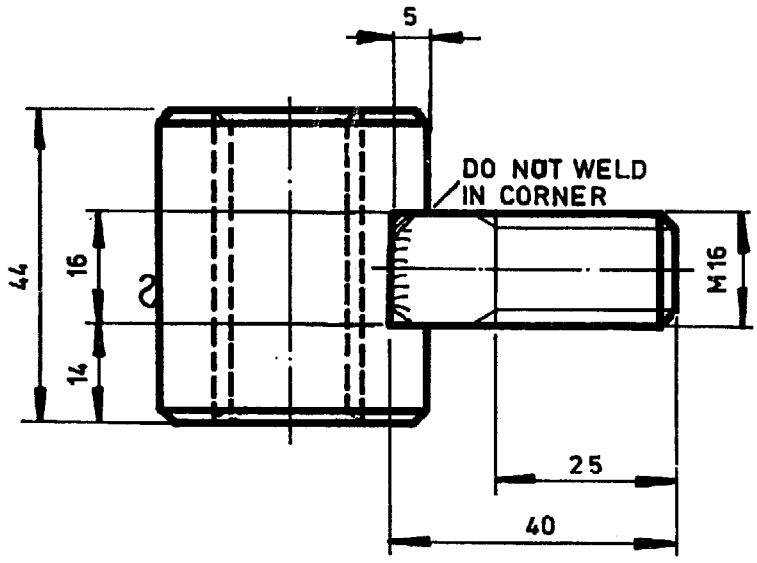


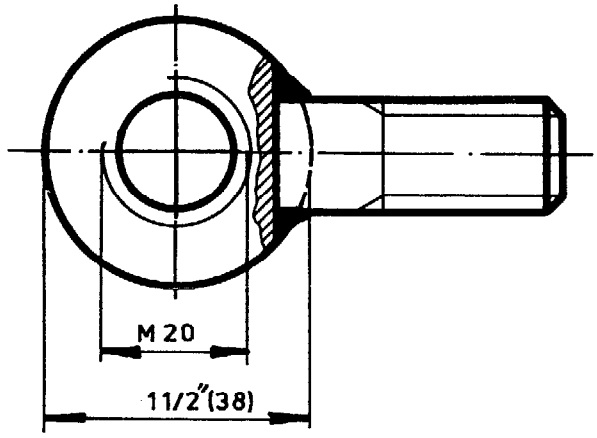
M.S.FLAT
1.PC

LEVER

T3/26/00 | S54

1:1





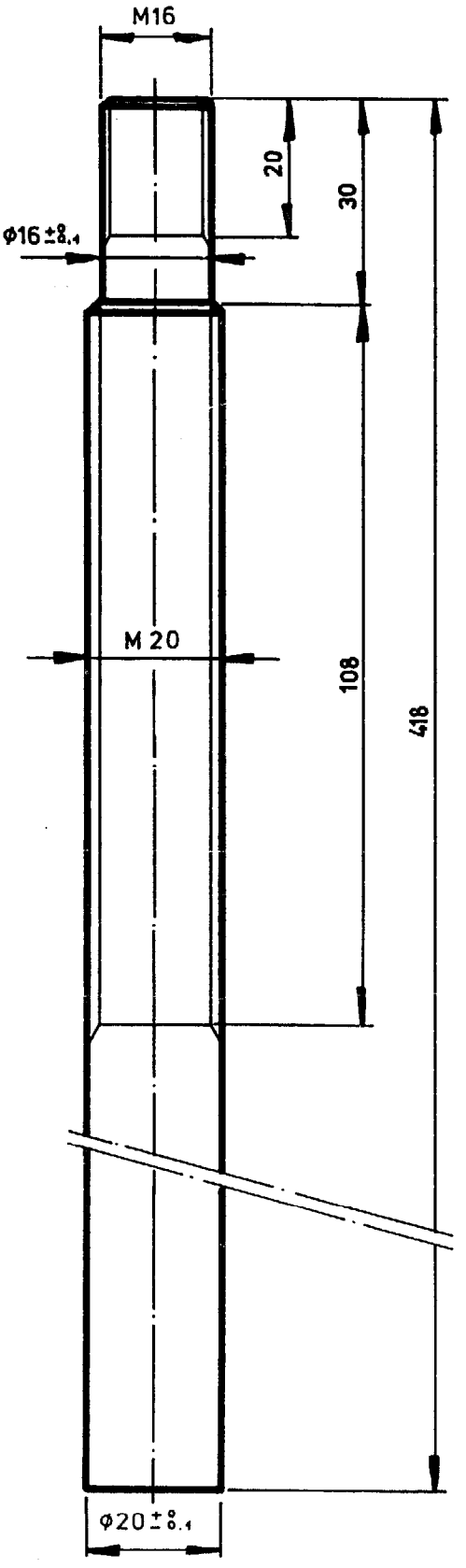
M.S.ROD

1.PC

LOCK NUT

T3/27/00 | S55

1:1



M.S.ROD 1.PC

SPINDLE

1 : 1

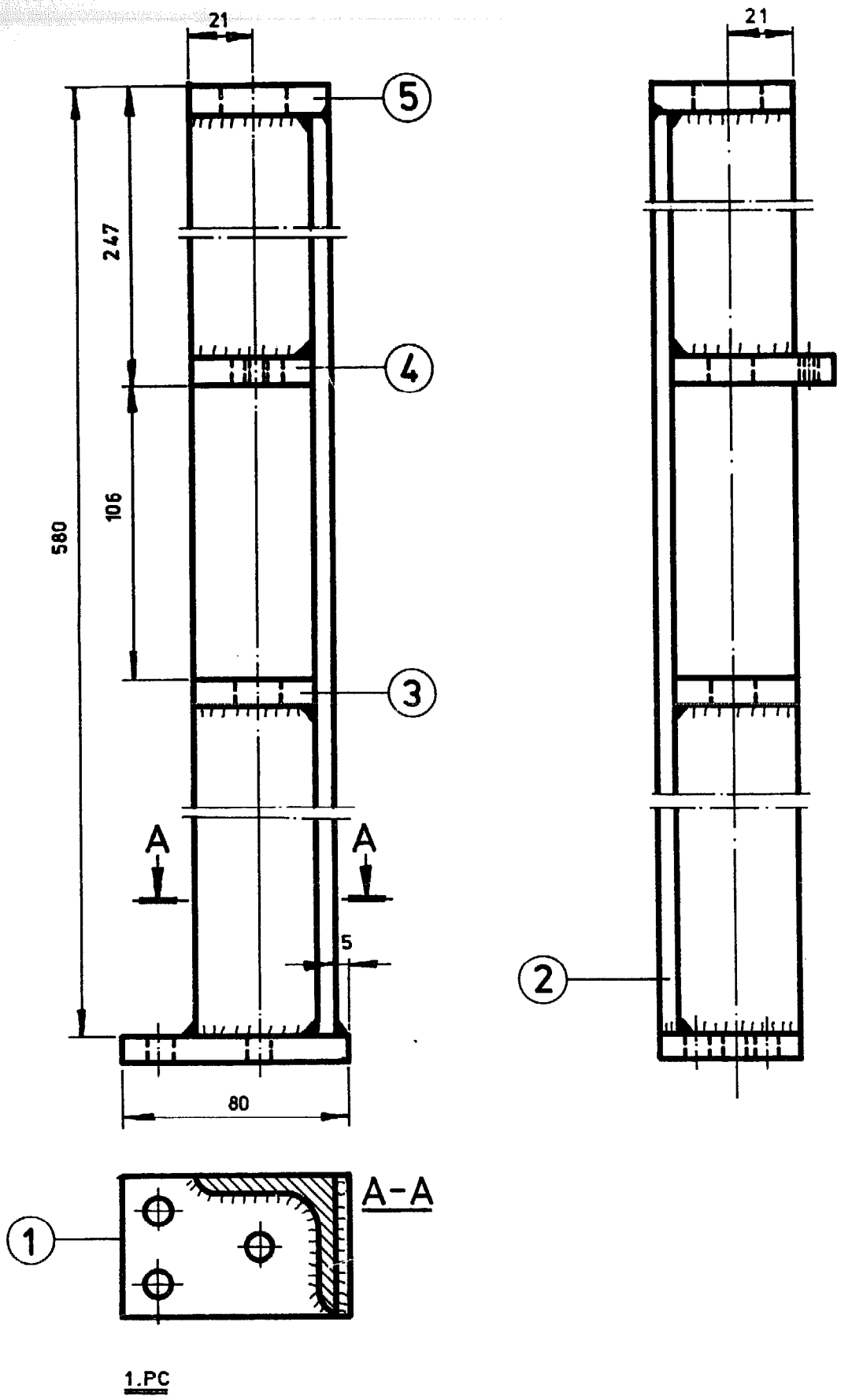
T3/28/00 | S56

POS	PCS	DENOMINATION	DRAWING NUMBER	SPECIFICATION	REMARKS
1	1	BASE PLATE	T3/29/01	M.S.PLATE 10MM X 80 X 50	
2	1	SUPPORT ANGLE	T3/29/02	M.S.ANGLE 50X50X6 X 570	
3	1	STOPPER PLATE BOTTOM	T3/29/03	M.S.PLATE 10MM X 44 X 44	
4	1	STOPPER PLATE TOP	T3/29/04	M.S PLATE 10MM X 56 X 44	
5	1	SUPPORT TOP PLATE	T3/29/05	M.S.PLATE 10 MM X 50 X 50	

SUPPORT ASSEMBLY

T3/29/00 | S57

PART LIST

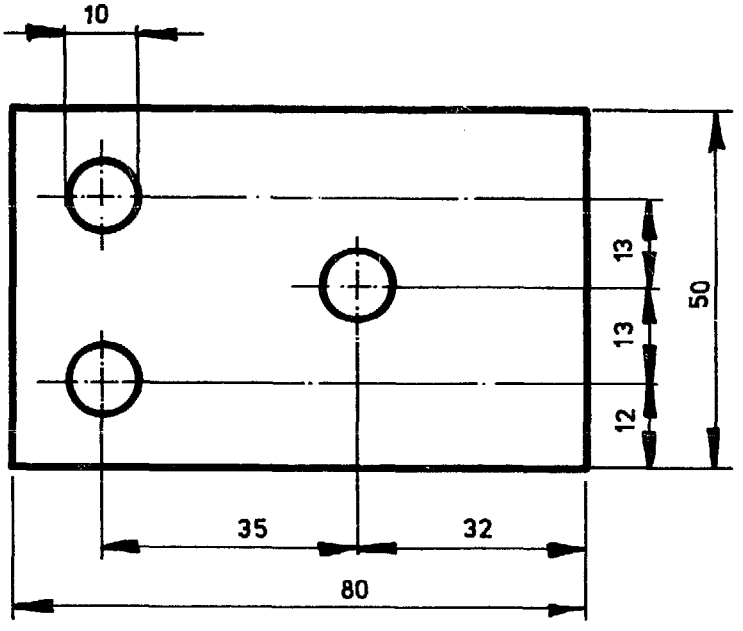


1.PC

SUPPORT ASSEMBLY

T3/29/00 S58

1:2



M.S.PLATE 10MM

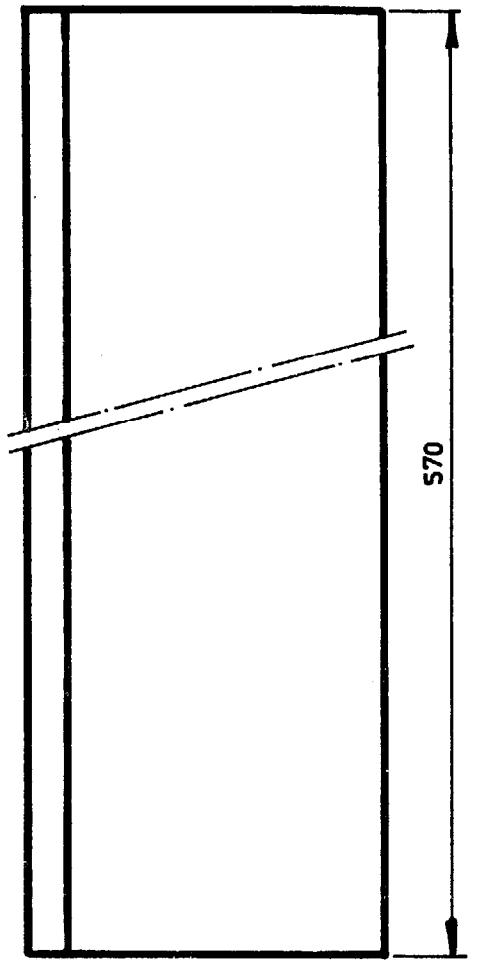
1.PC

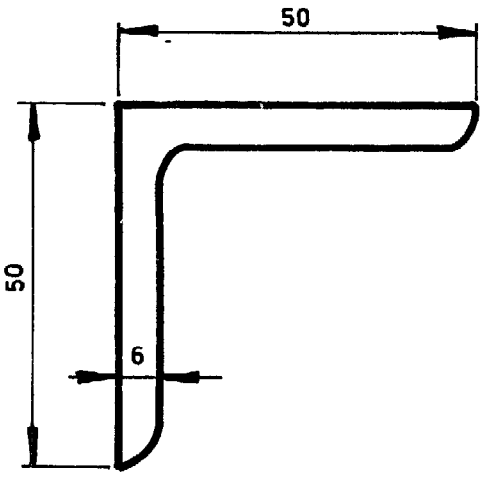
BASE PLATE

T3/29/01

S59

1:1





M.S. ANGLE

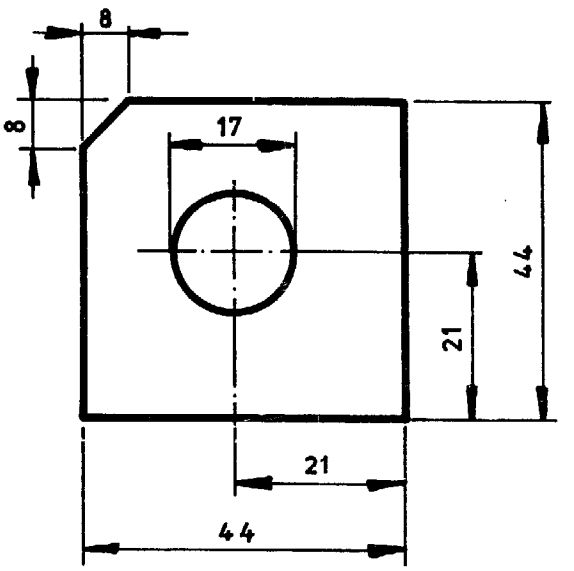
1.PC

SUPPORT ANGLE

T3/29/02

S60

1:1

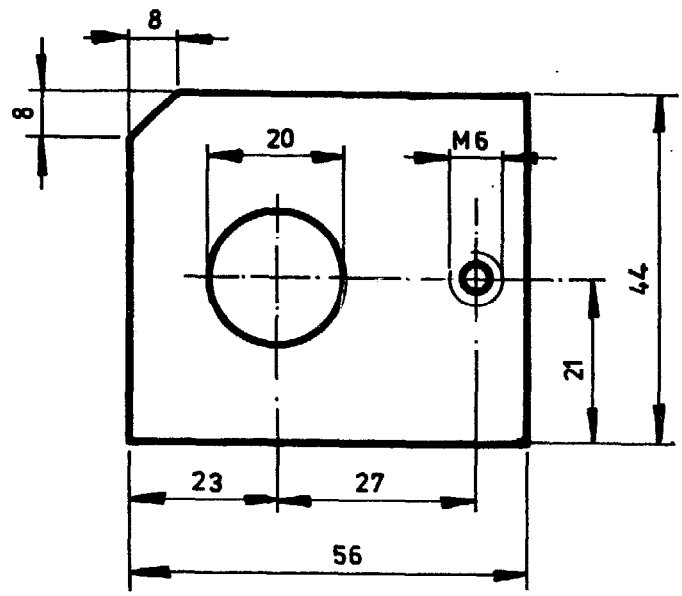


M.S.PLATE 10 MM

1.PC

STOPPER PLATE BOTTOM T3/29/03 S61

1:1



M.S.PLATE 10MM

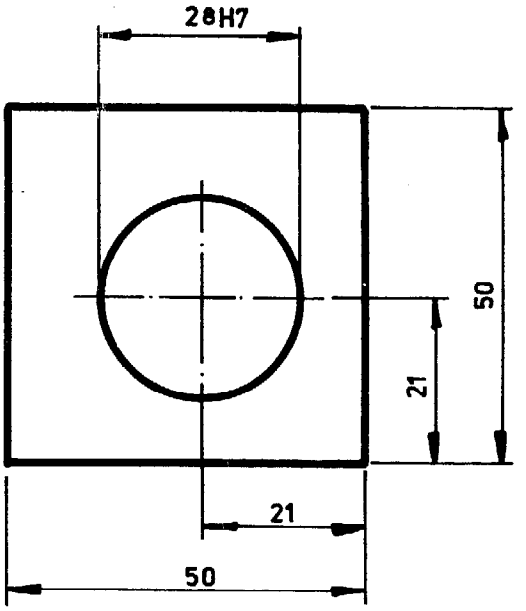
1.PC

STOPPER PLATE TOP

T3/29/04

S62

1:1



M.S.PLATE 10MM

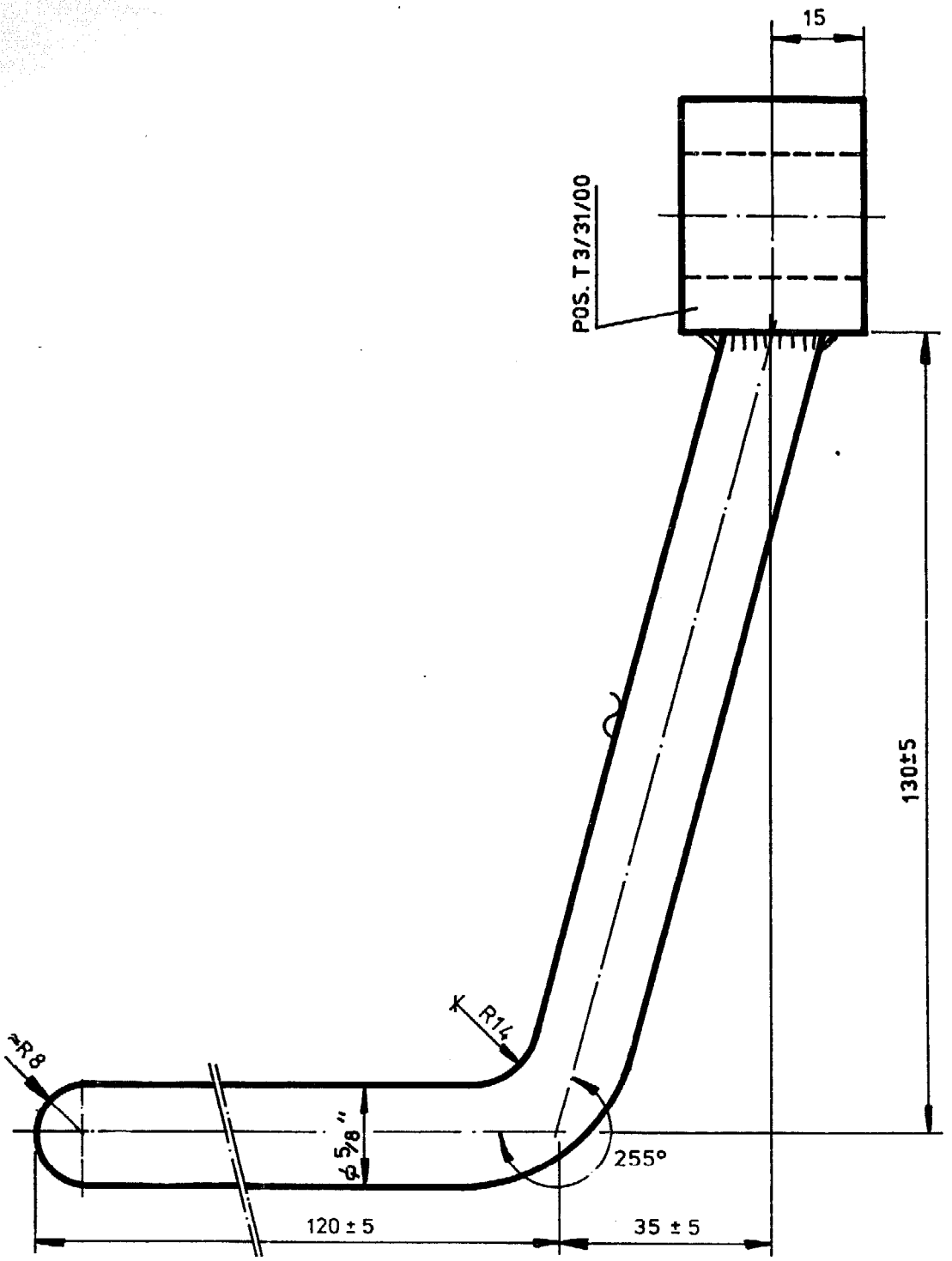
1.PC

SUPPORT TOP PLATE

T3/29/05

S63

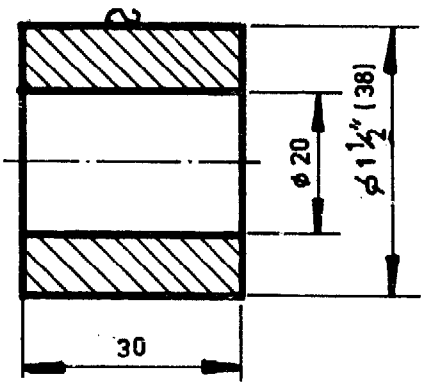
1:1



HANDLE

T3/30/00 | S64

1:1



M.S.ROD

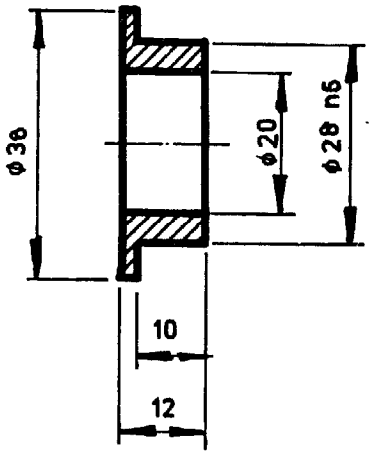
1.PC

KNOB

1:1

T3/31/00

S65



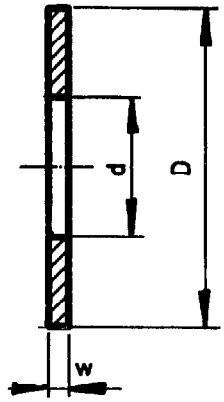
BRASS ROD

1.PC

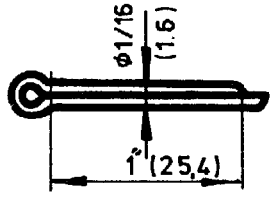
BUSH

1 : 1

T3/32/00 | S66



POS	D	d	w	PC
33	30	18	2	2
37	27	16	2	8

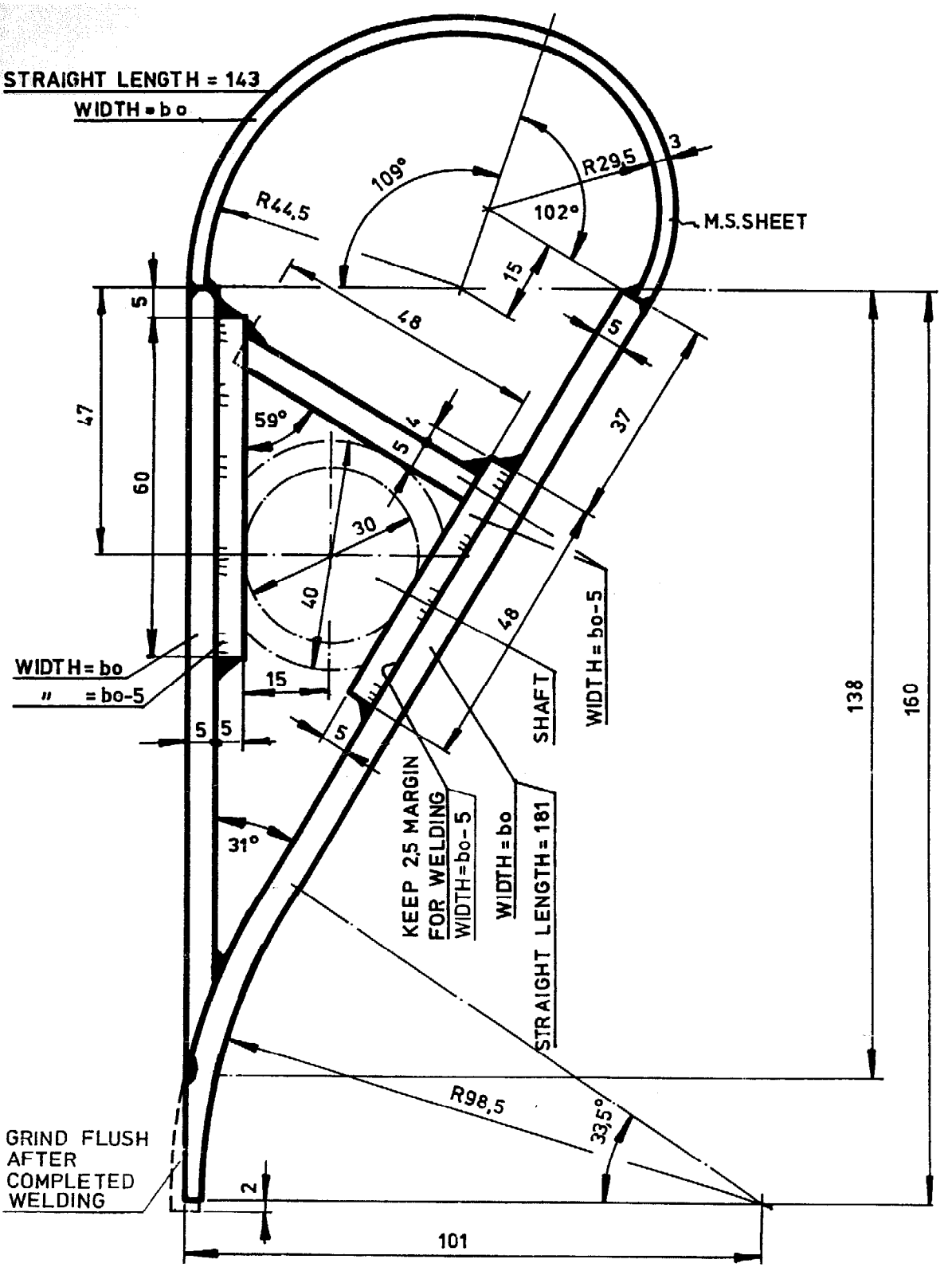


POS.T3/34/00

1 PC

WASHER/COTTER PIN

T3/33 34 37/00 | S67



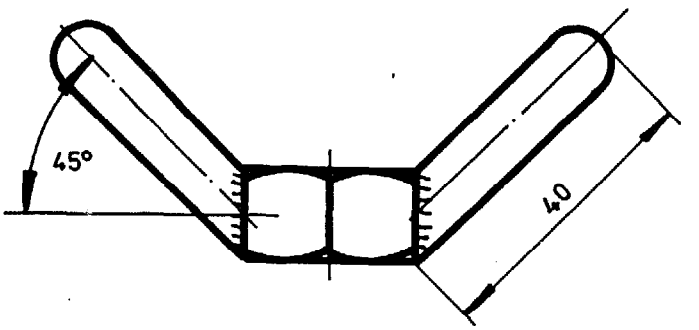
1.PC

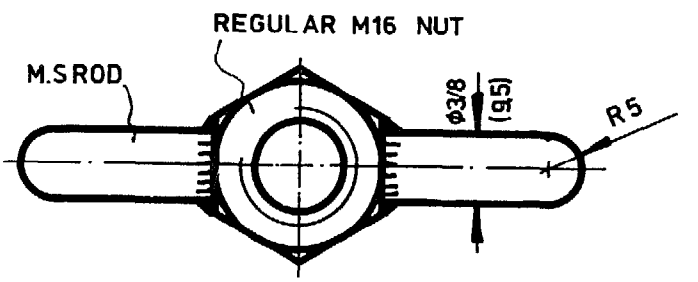
NOTE. DO FULL WELDING WITH SHAFT IN ITS PLACE

BUTTERFLY VALVE

T3/35/00 | S68

1:1



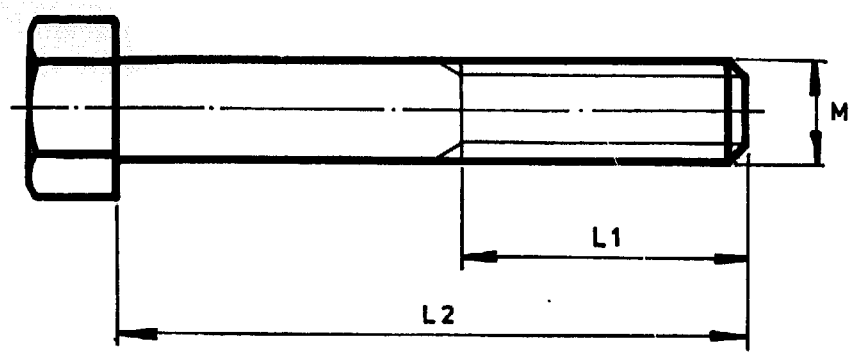


1.PC

WING NUT

T3/36/00 | S69

1:1

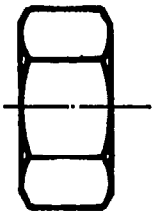


POS	M	L1	L2	FULL THREAD	NUMBER OF BOLTS bo 50	bo 70	bo 90	bo 120	bo 160	bo 220	bo 290	bo 390	bo 520	bo 690	bo 920
38	M14	30	70	NO	8	8	8	8	8	8	8	8	8	8	8
39	M12	30	30	YES	22	22	22	26	26	30	34	38	46	54	64
41	M8	15	15	YES	1	1	1	1	1	1	1	1	1	1	1
42	M6	10	10	YES	4	4	4	4	4	4	4	4	4	4	4
43	M6	50	50	YES	8	8	8	8	8	8	8	8	8	8	8
45	M6	20	20	YES	12	14	14	16	18	18	20	22	26	30	38
47	M6	15	30	NO	3	3	3	3	3	3	3	3	3	3	3
49	M6	30	30	YES	1	1	1	1	1	1	1	1	1	1	1

HEX. BOLTS

T3/38,39,41.42,43,45,47,49/00

S70



POS	SIZE	NUMBER OF NUTS bo50	bo70	bo90	bo120	bo160	bo220	bo290	bo390	bo520	bo690	bo920
40	M12	22	22	22	26	26	30	34	38	46	54	64
44	M6	8	8	8	8	8	8	8	8	8	8	8
46	M6	12	14	14	16	18	18	20	22	26	30	38
48	M6	3	3	3	3	3	3	3	3	3	3	3
50	M6	1	1	1	1	1	1	1	1	1	1	1
51	M16	2	2	2	2	2	2	2	2	2	2	2

HEX. NUT

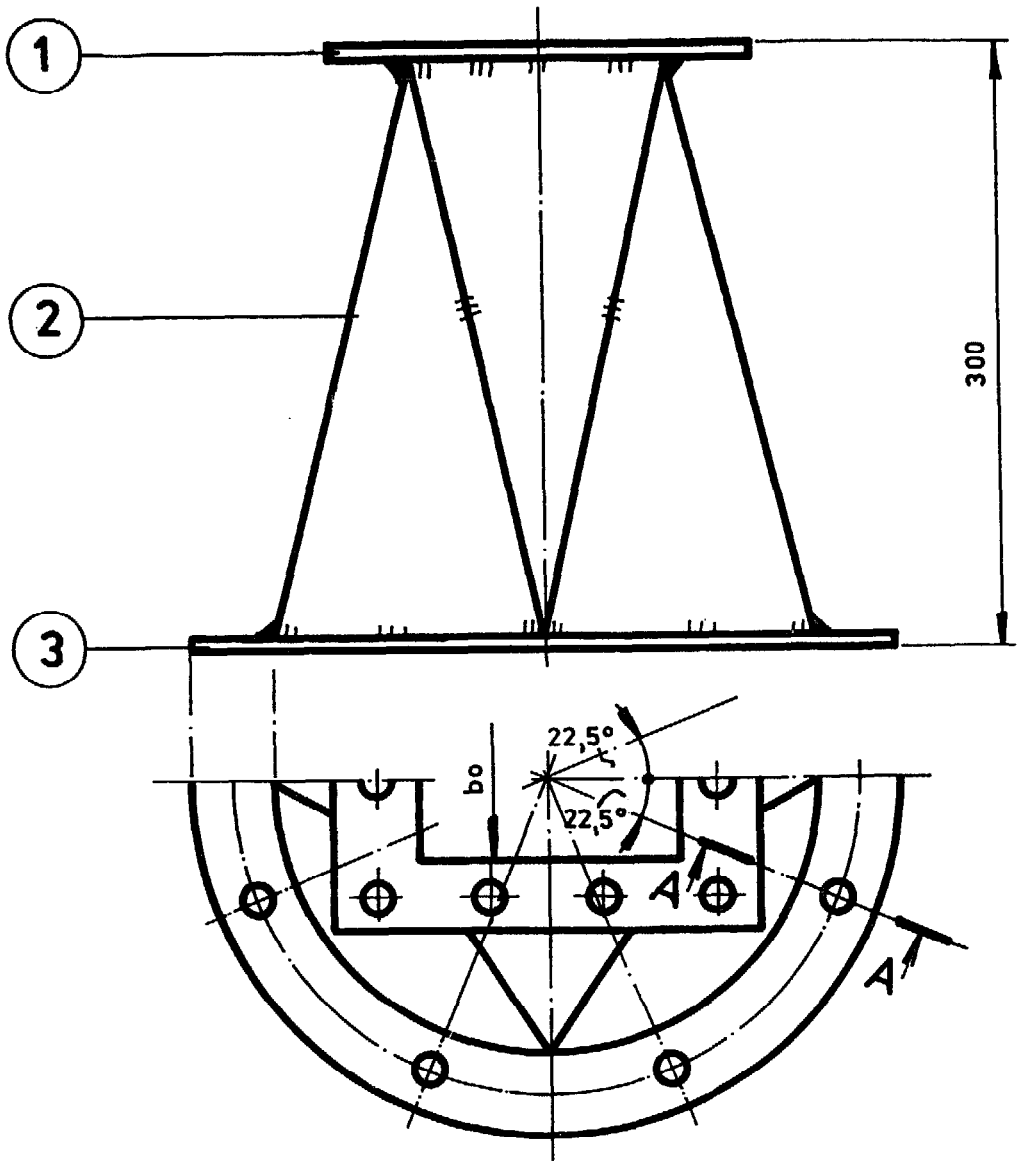
T3/40.44.46.48.50.51/00

S71

1	1	INLET FLANGE	T3/06/03	M.S. FLAT 50X6
2	1	ADAPTER	T3/52/02	M.S. SHEET 2.5 M.M
3	1	PENSTOCK FLANGE	T3/52/03	M.S. PLATE 8 MM

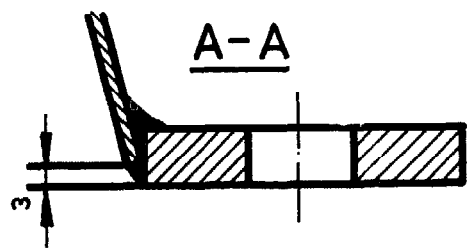
ADAPTER ASSEMBLY T3/52/00 S72

PART LIST



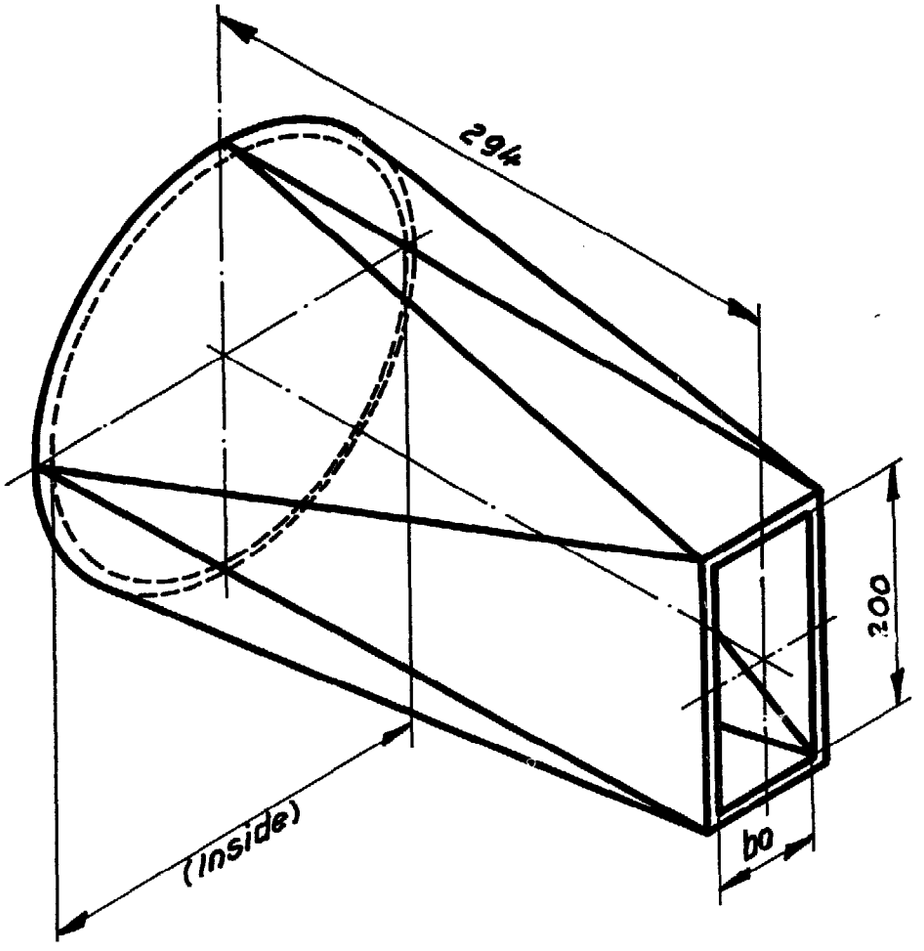
NOTE.

USE 1PC INLET FLANGE (T3/06/03) FOR POS.1



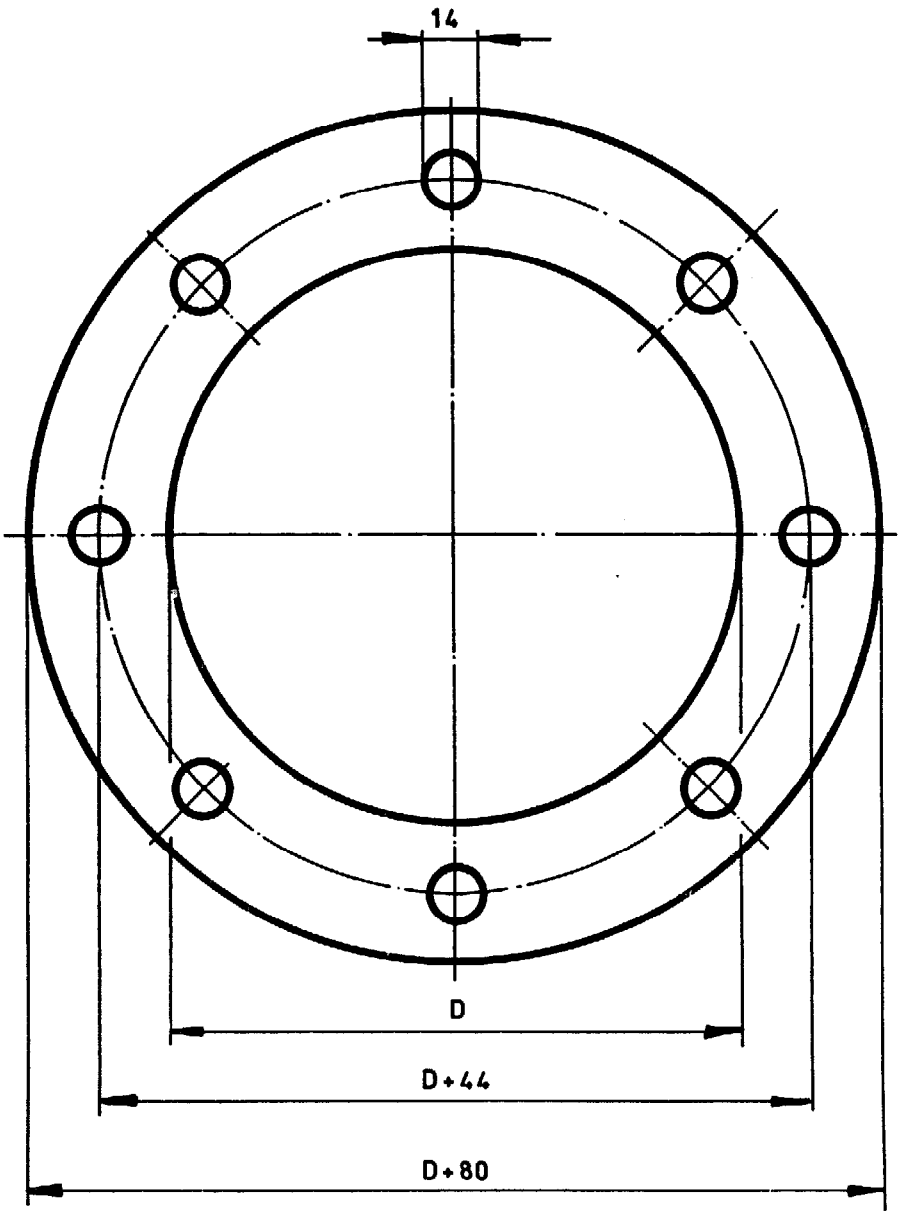
ADAPTER

T3/52/00 | S73



ADAPTER

T3/52/01 | S74



M.S.PLATE 8MM

PCS

D = INSIDE DIAMETER OF PENSTOCK + 6

PENSTOCK FLANGE

T3/52/01 | S75