

TRADE TRAINING II

TTC PROGRAMME

FITTER GENERAL and MILLWRIGHT

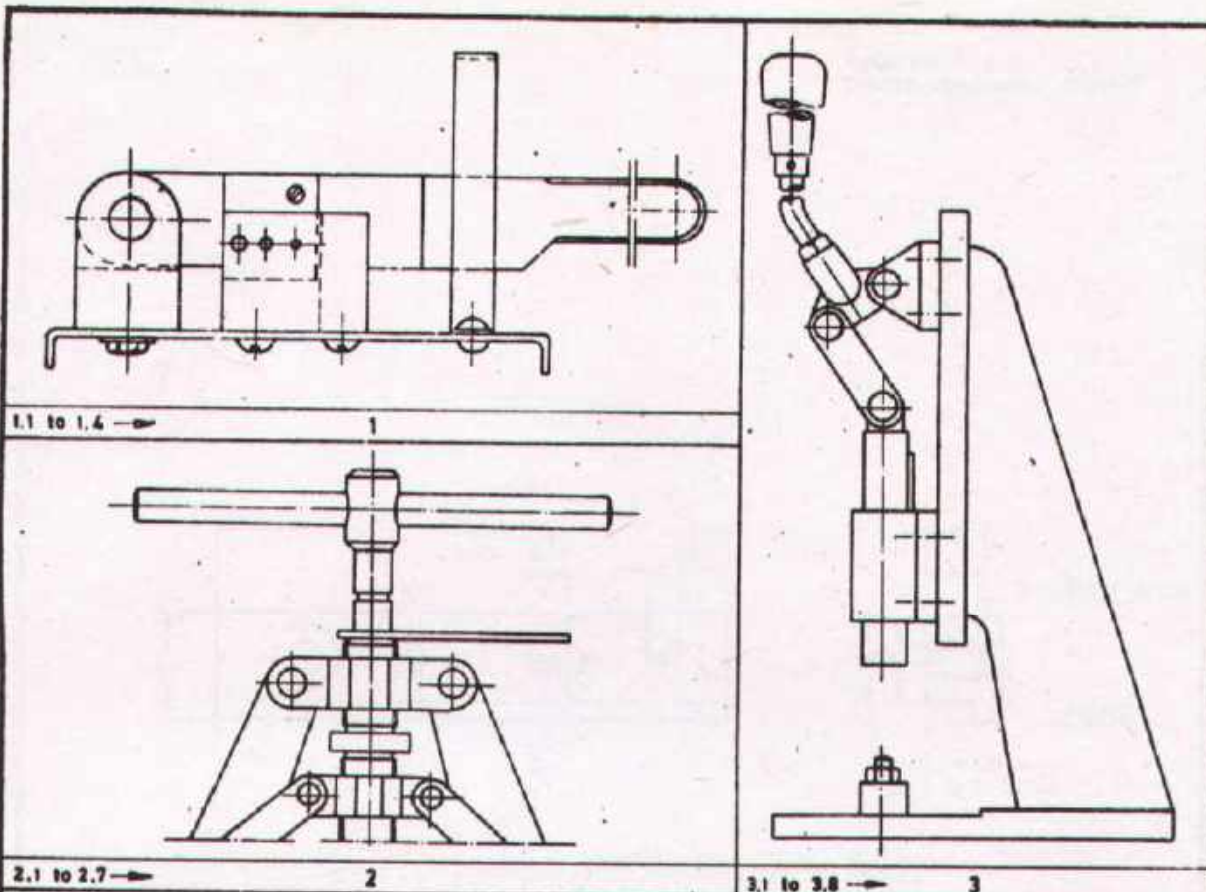


GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
TRADE TESTING CELL, LAHORE.

PRICE Rs. 39/-

T.T.P.SERIES No.28





The workpieces of "Fitting III" are produced in teamwork in groups of up to 6 trainees.

In such team work the trainees learn how to work in a group and will realize that co-operation in the workshop is a must.

Each trainee will not only have to manufacture different workpieces but the group will also have to assemble the pieces made by the different members.

Thus both co-operation and accuracy as required in the assembling will have been taught to the groups.

Pieces and devices which are not finished during one semester can be finished during the next semester.

After several semesters the present training exercises can be changed with other similar training exercises.

The cutting device can be manufactured by each trainee on his own.

TRADE TRAINING II

LAYOUT

Mp/2.1/3.3.1

FITTING III



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING II

FITTING III (CUTTING DEVICE)

No. 3.3.1/1 to 18	Part Nos.		(Length given in Millimeter)															Length per Trainee	Total for 16 Trainees	Weight for 16 Trainees
	1	2	7	8	9	10	11	12	13	14	15	16	17	18						
M.S.Sheet 72x3.2mm (3" x 1/8")	160																	160 mm	2.6 meter	4.5 kg
M.S.Flat 32x10 mm (1 1/4" x 3/8")		231																231 mm	3.7 meter	9.3 kg
M.S.Sheet 14x2 mm (9/16" x 3/32")			210															210 mm	3.4 meter	0.8 kg
M.S.Sheet 28x3.2mm (1 1/8" x 1/8")				28														28 mm	0.45meter	0.3 kg
M.S.Round Ø 12 mm (1/2" DIA)					43													43 mm	0.69meter	0.62 kg
M.S.Split Pin 3x15mm (1/8"x5/8")						-												2 Nos.	36 Nos.	
M.S.Round Head Rivet 4x12mm (5/32"x1/2")							-											2 Nos.	36 Nos.	
Hex. Head Screw M8x12mm (5/16"x1/2")								-										1 No.	18 Nos.	
M.S.C.S.Head Screw M5x10mm (3/16"x3/8")									-									2 Nos.	36 Nos.	
M.S.R.H.Screw M5x8mm (3/16"x5/16")										-								2 Nos.	36 Nos.	
M.S.C.H.Screw M4x18mm (5/32"x3/4")											-							1 No.	18 Nos.	
Parallel pin Ø3x18mm (1/8"x3/4")													-					1 No.	18 Nos.	
M.S.Washer Ø 5.5 mm															-			2 Nos.	36 Nos.	
M.S.Washer Ø 10.5 mm																		2 Nos.	36 Nos.	



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING II

FITTING III (PULLER)

No. 3.3.1/1 to 14

PART NOS.

(Length given in Millimeter)

No. 3.3.1/1 to 14	5	6	7	8	9	10	11	12	13	14	Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
M.S.Flat 84x12.7mm (3 3/8"x1/2") 2 pcs	484										484 mm	7.75meter	26.2 kg
M.S.Flat 38x6.4 mm (1 1/2" x 1/4")		130									130 mm	2.1 meter	4.0 kg
M.S.Flat 18x6.4 mm (3/4"x1/4") 4 pcs.			264								264 mm	4.3 meter	3.9 kg
M.S.Round ϕ 18 mm (3/4" DIA)				286	45						331 mm	5.3 meter	10.6 kg
M.S.Round ϕ 16 mm (5/8" DIA)						40					40 mm	0.64meter	1.1 kg

	Total Nos. per Trainee	Total Nos. for 16 Trainees
M.S.Split Pin 3 mm	2 Nos.	36 Nos.
M.S.Washer ϕ 8.5 mm	4 Nos.	70 Nos.
M.S.Washer ϕ 10.5 mm	2 Nos.	36 Nos.
M.S.Split Pin 2 mm	4 Nos.	70 Nos.

MATERIAL REQUIRED

TRADE TRAINING II

FITTING III (TOGGLE PRESS)

No. 3.3.1/1 to 22

PART NOS.

(Length given in Millimeter)

No.	Description	Length given in Millimeter													Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
		1	2	3	4	5	6	7	8	9	10	11	12	13			
M.S.Flat 230x16 mm (9 1/4" x 5/8")	230														230 mm	3.7 meter	108.9 kg
M.S.Flat 142x16 mm (5 5/8" x 5/8")	255														255 mm	4.1 meter	72.0 kg
M.S.Flat 125x9.6mm (5"x3/8") (2 pcs.)	670														670 mm	10.8 meter	100.7 kg
Cast Iron Bracket															Cast according to pattern		
M.S.Flat 50x12.7mm (2" x 1/2")				66											66 mm	1.1 meter	5.6 kg
M.S.Flat 50x9.6mm (2"x3/8") (2 pcs.)				60											60 mm	0.96meter	3.8 kg
M.S.Round Ø25.4 mm (1" DIA)					165										165 mm	2.7 meter	10.9 kg
M.S.Flat 19x9.6 mm (3/4"x3/8") (2 pcs)						168	45								213 mm	3.5 meter	5.3 kg
M.S.Flat 30x9.6 mm (1 1/4" x 3/8")								69							69 mm	1.1 meter	2.6 kg
M.S.Squ. 25x25 mm (1" squ.)									42						42 mm	0.67meter	3.3 kg
M.S.Squ. 9.6x9.6 mm (3/8" squ.)									96						96 mm	1.6 meter	1.3 kg
Brass Round Ø37mm (1 1/2" DIA)											105				105 mm	1.7 meter	15.6 kg
M.S.Round Ø12.7 mm (1/2" DIA)												135			135 mm	2.2 meter	2.2 kg
M.S.Round Ø 19 mm (3/4" DIA)														45	50 mm	0.8 meter	1.9 kg

continued



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING II

FITTING III (TOGGLE PRESS)

No. 3.3.1/15 to 22 PART NOS.

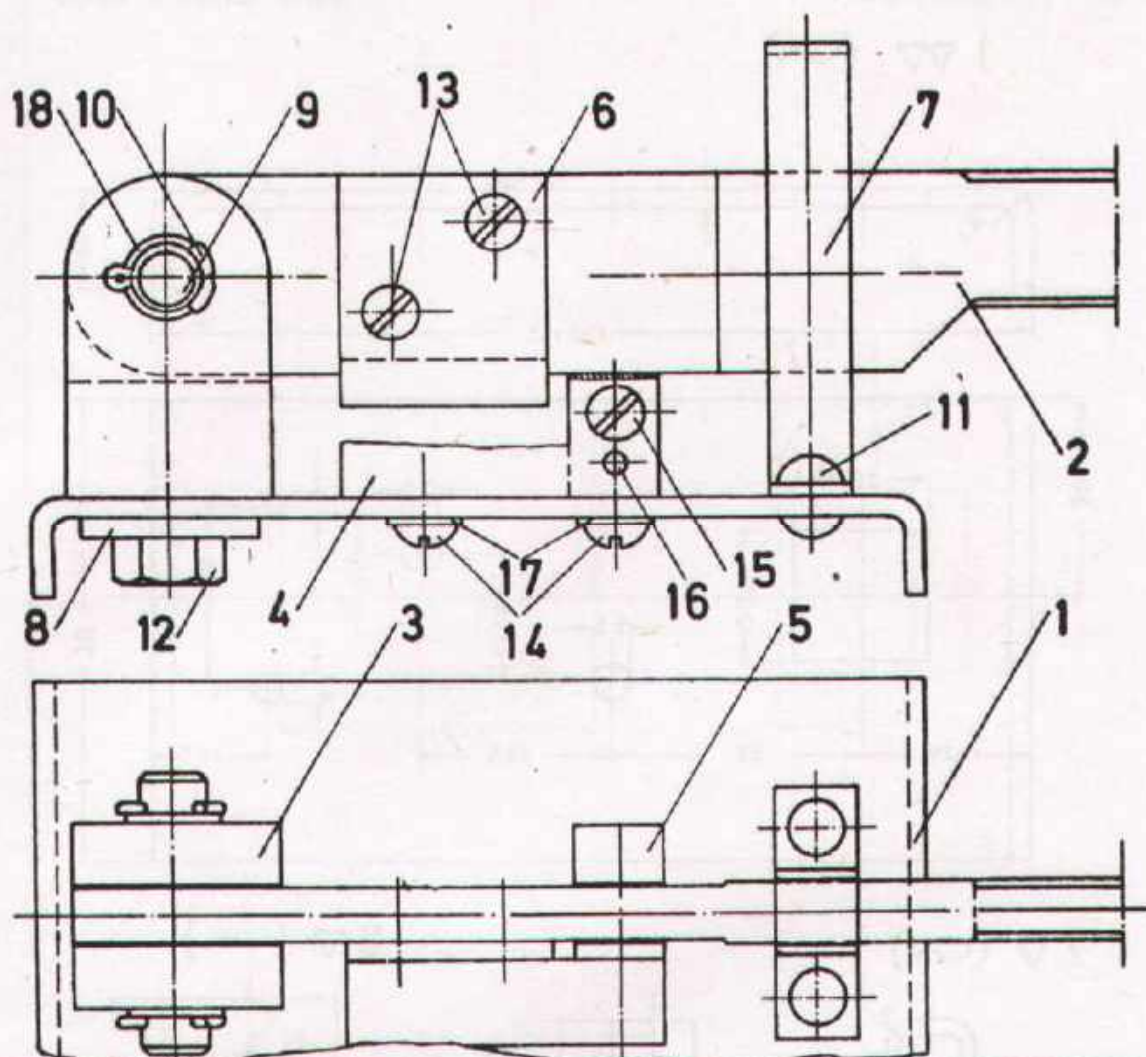
(Length given in Millimeter)

No. 3.3.1/15 to 22	PART NOS.										Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
	15	20	3,4	3,5	5,3	8	9&17	14	16	16			
M.S.Platt 25,4x6,4mm (1"x1/4") (2 pcs.)	76										152 mm	2.5 meter	3.2 kg
M.S.Round Ø 12.7 mm (1/2"x2") (2 pcs.)	76										100 mm	1.6 meter	1.6 kg
		100											
											Total Nos. per Trainee	Total Nos. for 16 Trainees	
C.H.Screw M 5 x 18 mm			-								4 Nos.	70 Nos.	
Parallel Pins Ø 5 x 18 mm				-							2 Nos.	36 Nos.	
C.S.HD-Rivets Ø 6 x 24 mm					-						2 Nos.	36 Nos.	
Screw C.S.K.HD M 3 x 12 mm					-						2 Nos.	36 Nos.	
Hex. Screw M 8 x 20 mm						-					8 Nos.	135 Nos.	
Spring Wire Ø1.5mm Circlip							-				3 Nos.	50 Nos.	
M.S. Taper Pin Ø 4 x 20 mm								-			1 No.	18 Nos.	
M.S.Parallel Pin Ø 6 x 20 mm									-		2 Nos.	36 Nos.	
M.S.Nut M 12										-	1 No.	18 Nos.	
M.S.Nut M 10											2 Nos.	36 Nos.	
M.S.Washer Ø 10.5 mm											2 Nos.	36 Nos.	



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



18	2	WASHER ϕ 10.5 mm	
17	2	WASHER ϕ 5.5 mm	
16	1	PARALLEL PIN 3 x 18 mm	
15	1	C.H. SCREW M4 x 10 mm	
14	2	R.H. SCREW M5 x 8 mm	
13	2	C.S.H. SCREW M5 x 10 mm	
12	1	HEX. SCREW M8 x 12 mm	
11	2	R.H. RIVET 4 x 12 mm	
10	2	SPLIT PIN 3 x 15 mm	
9	1	BOLT	DRG. NO. 1.1
8	1	SQUARE WASHER	DRG. NO. 1.1
7	1	STOP	DRG. NO. 1.1
6	1	CUTTING BLADE	DRG. NO. 1.2
5	1	BRACKET	DRG. NO. 1.4
4	1	BRACKET	DRG. NO. 1.4
3	1	PEDESTAL	DRG. NO. 1.3
2	1	HANDLE	DRG. NO. 1.2
1	1	BASE	DRG. NO. 1.1
P.-No.	Qty.	DENOMINATION	REMARKS

SCALE 1:1

MAT. MILD STEEL

CUTTING DEVICE

Mp/2.3/3.3.1/1

FITTING III

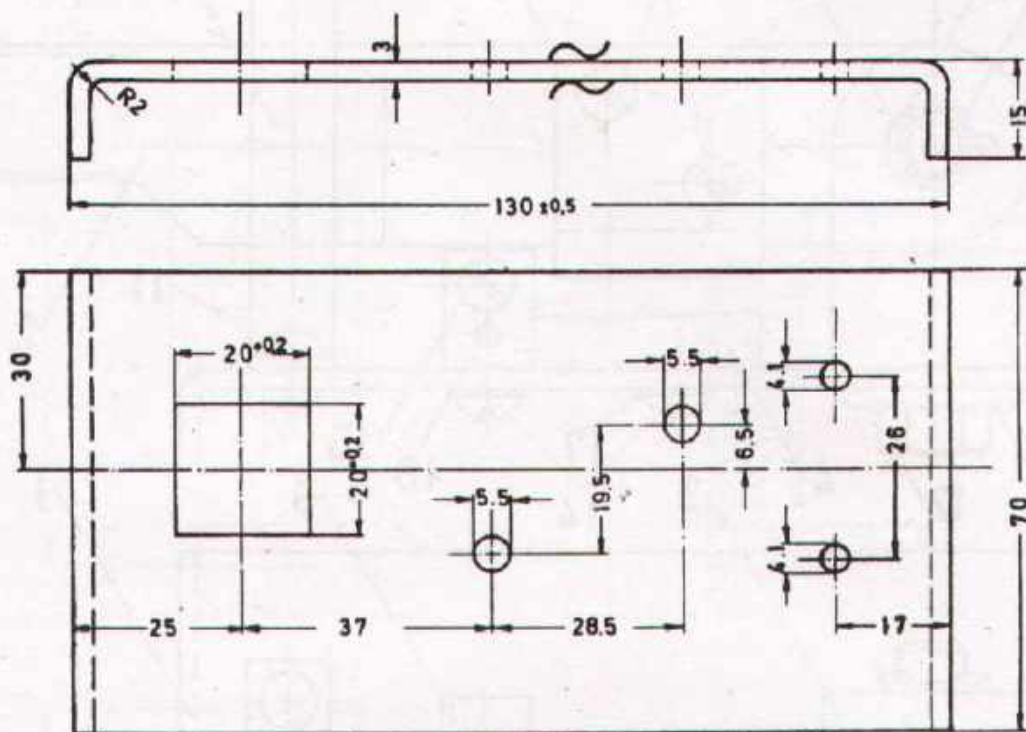


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

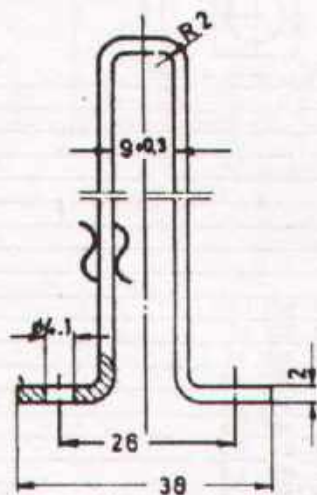
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Tolerance ± 0.1
unless otherwise stated

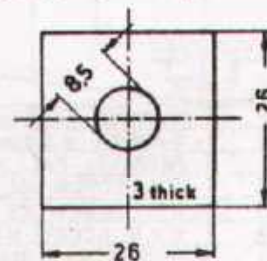
1 W (S)



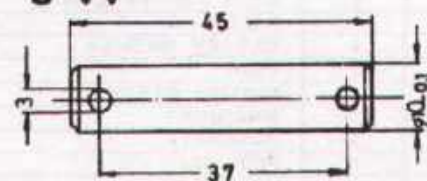
7 Δ (S)



8 Δ (S)



9 W



SCALE 1:1

MAT. MILD STEEL

CUTTING DEVICE/DETAILS

Mp/2.3/3.3.1/1.1

FITTING III



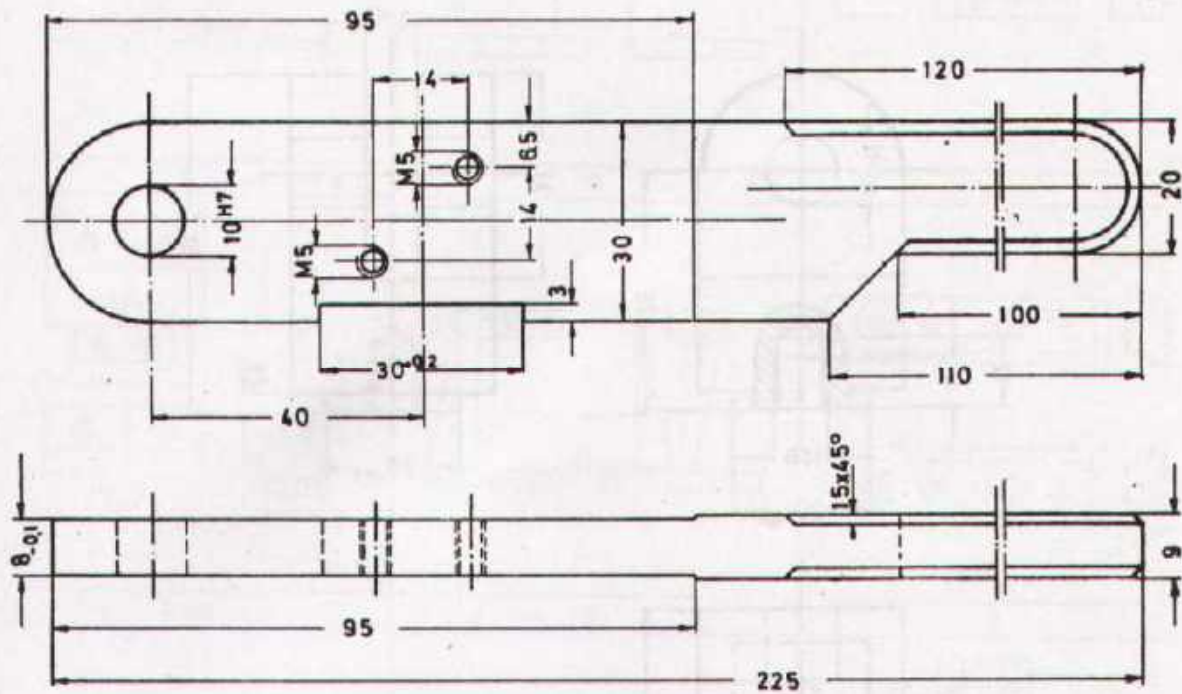
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

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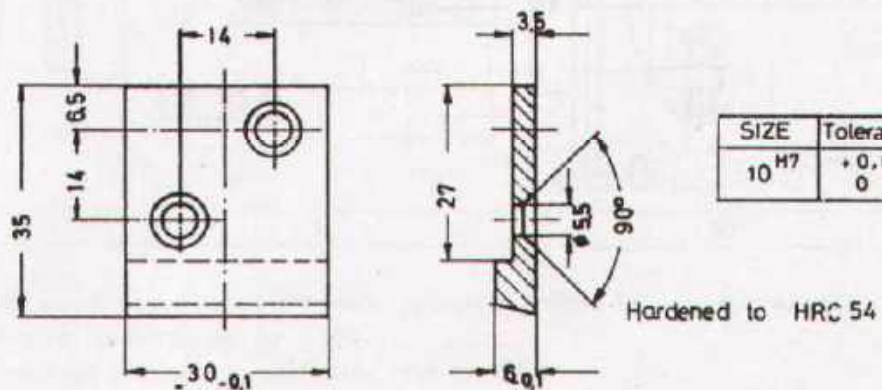


Tolerance $\pm 0,1$
unless otherwise stated

2



6



SIZE	Tolerance
10 H7	+0.015 0

SCALE 1:1

MAT. MILD STEEL

HANDLE & C-BLADE

Part 6 from Ex. 235/8

Mp/2:3/3.3.1/1.2

FITTING III



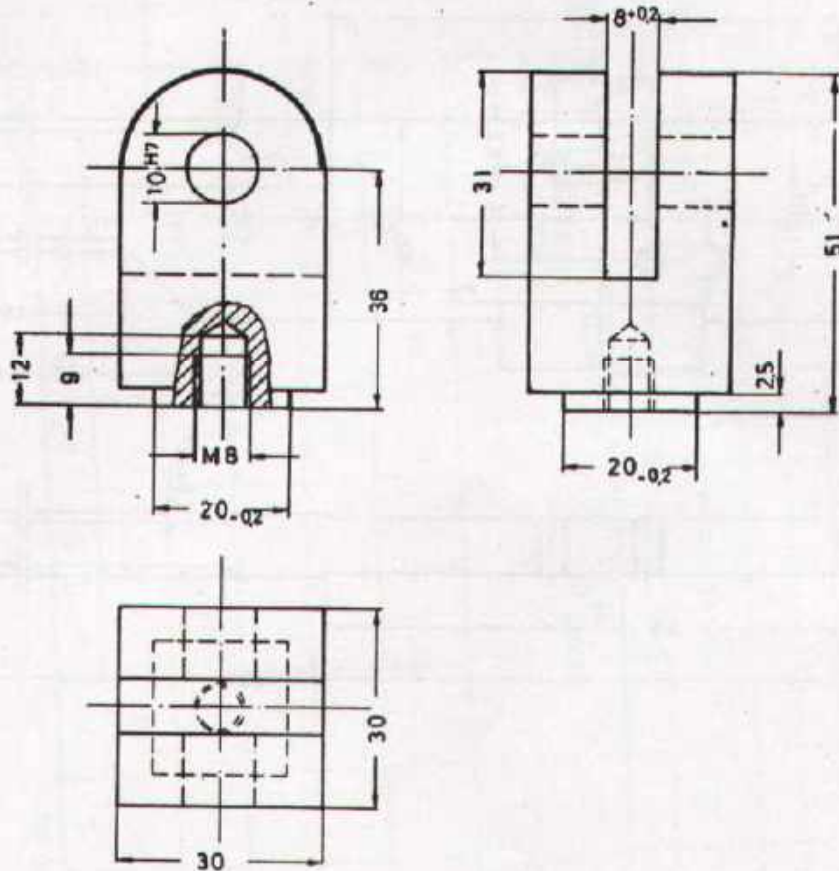
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

3



SIZE	TOLERANCE
10 ^{H7}	+0.015 0

SCALE 1:1

MAT. MILD STEEL

from 236/g

PEDESTAL

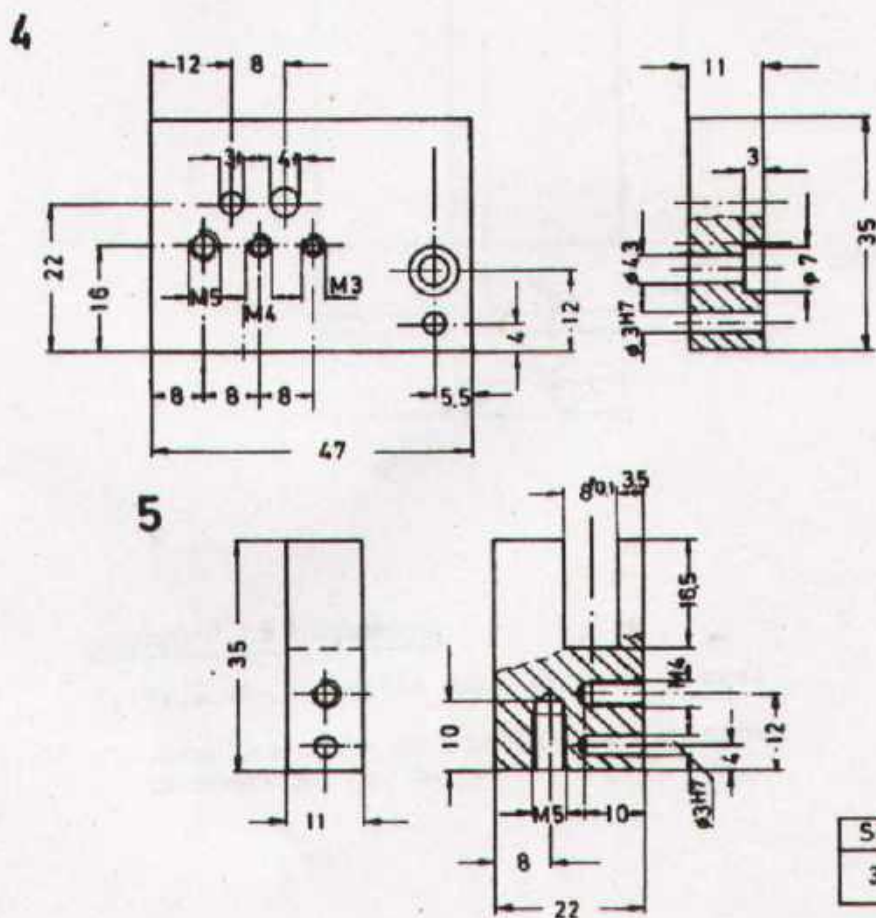
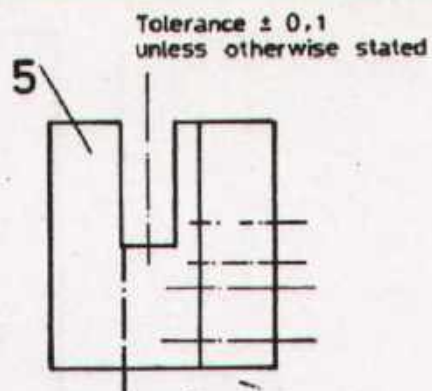
Mp/2.3/3.3.1/13

FITTING III



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

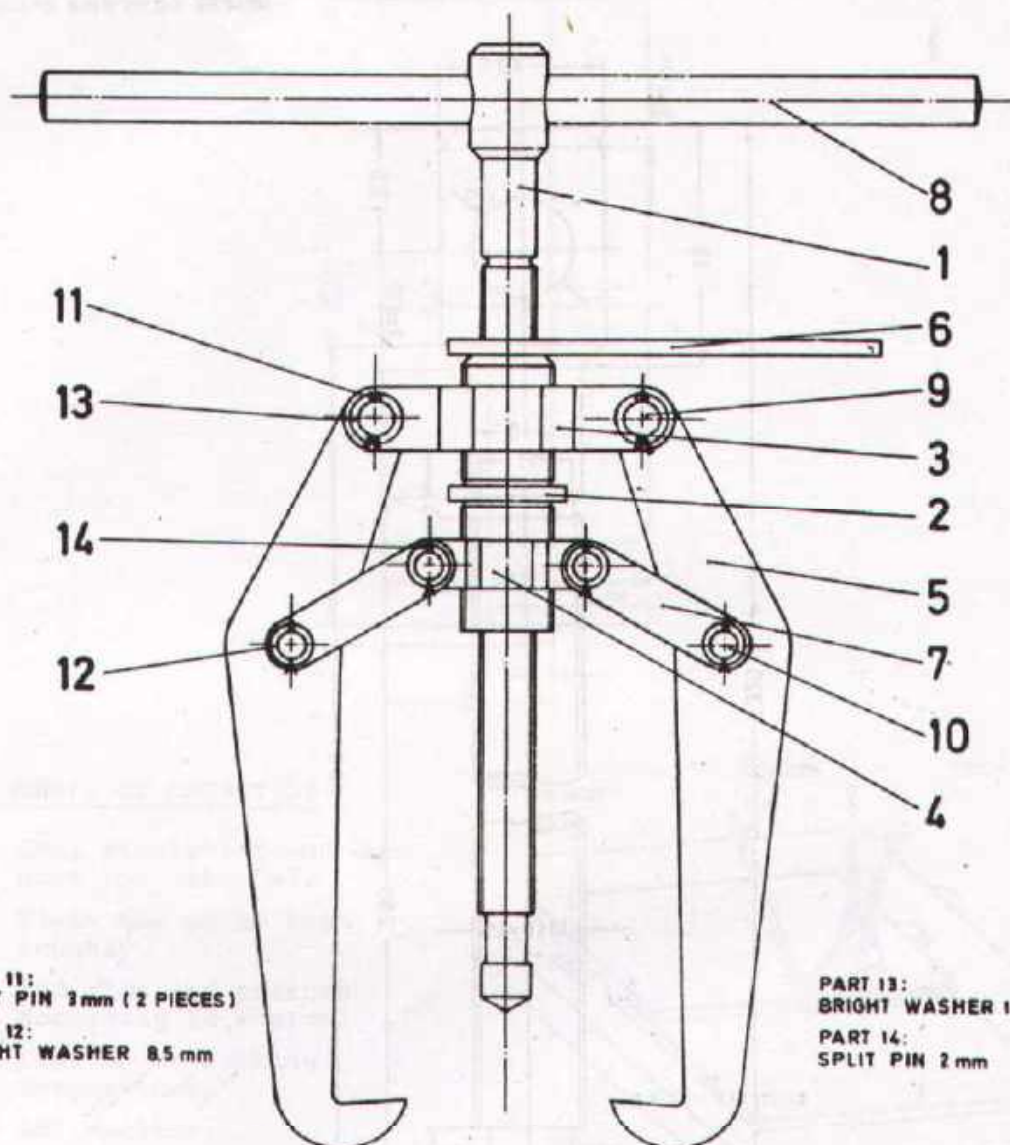


SIZE	TOLERANCE
3 H7	+0.010 0

FITTING III



PAK-GERMAN TECHNICAL TRAINING PROGRAMME



PART 11:
SPLIT PIN 3mm (2 PIECES)

PART 12:
BRIGHT WASHER 8.5 mm

PART 13:
BRIGHT WASHER 10.5mm

PART 14:
SPLIT PIN 2 mm

10	4	BOLT	DRG. 2.7
9	2	BOLT	DRG. 2.7
8	1	HANDLE	DRG. 2.7
7	4	CONNECTING LINK	DRG. 2.6
6	1	KEY 19 mm	DRG. 2.6
5	2	GRAB HOOK	DRG. 2.5
4	1	GUIDE NUT	DRG. 2.4
3	1	LINK PIECE	DRG. 2.3 " " " "
2	1	SCREW SOCKET	DRG. 2.2 " " " "
1	1	SPINDLE	DRG. 2.1 " " " "

S-No	Qty	DENOMINATION	REMARKS
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SCALE 1:1

MAT. MILD STEEL

PULLER

Mp / 2.3/3.3.1/2

FITTING III

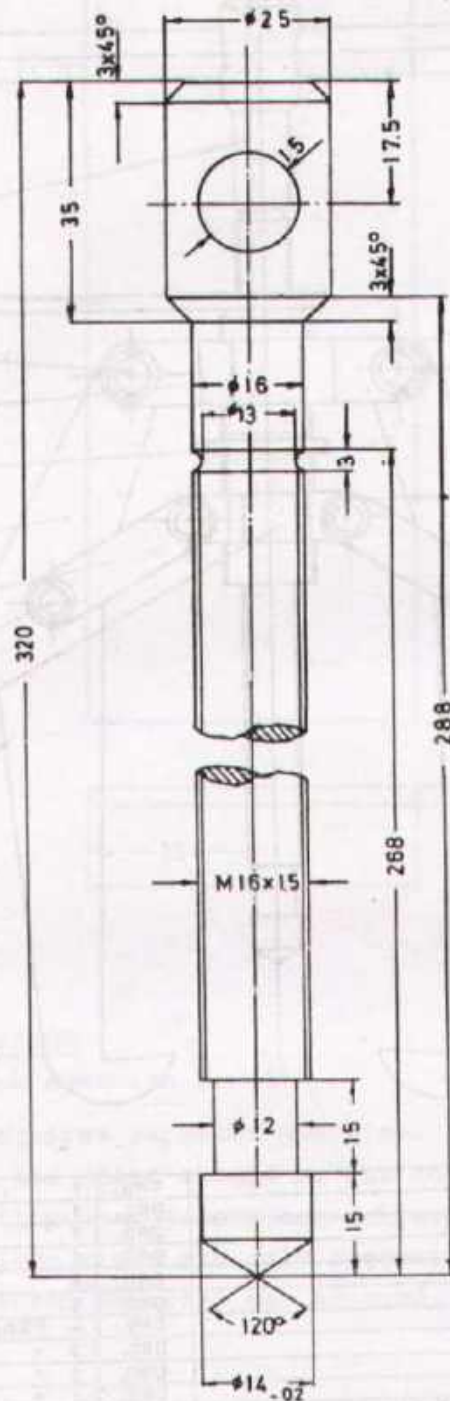


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated



SCALE 1:1

MAT. MILD STEEL

from 3.11/16

SPINDLE (for puller)

Mp/2.3/3.3.1/2.1

FITTING III



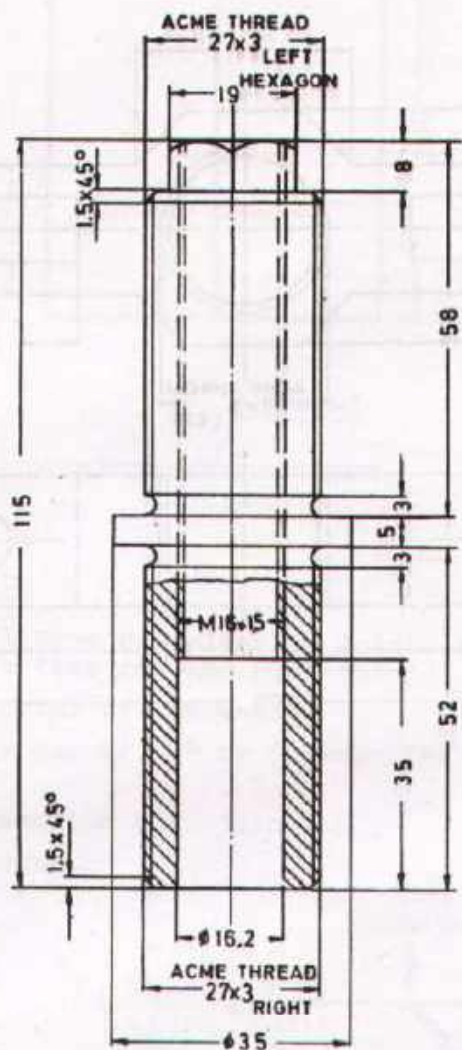
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

2



SCALE 1:1

MAT. MILD STEEL

SCREW SOCKET

from Ex. 311/1B

(For Puller)

Mp/2.3/3.3.1/2.2

FITTING III



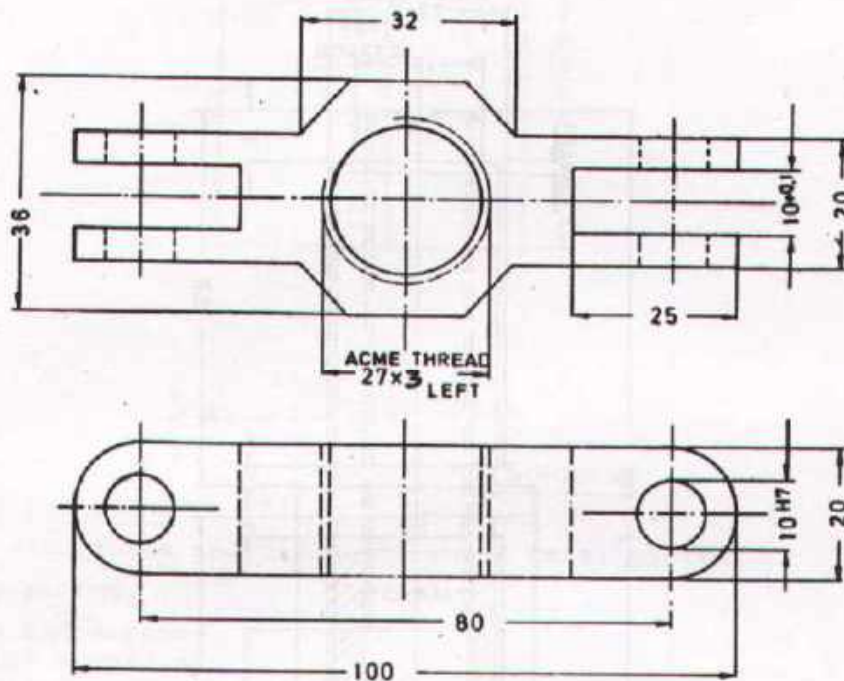
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

3



SIZE	TOLERANCE
10 H7	+0,015 0

SCALE 1:1

MAT. MILD STEEL

LINK PIECE

from Ex. 3.1.1/19

(For Puller)

Mp/2 3/3.3.1/23

FITTING III



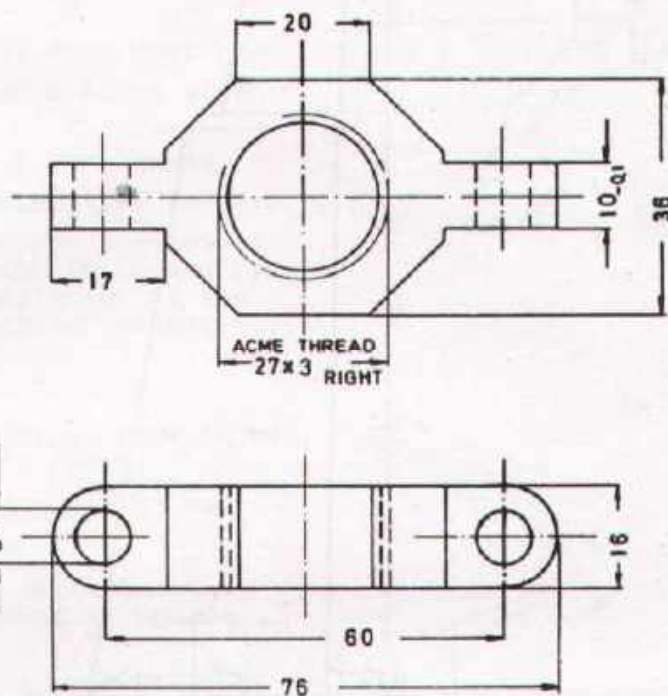
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

4



SIZE	TOLERANCE
8 H7	$+0,015$ 0

SCALE 1:1

MAT. MILD STEEL

from 313/16

GUIDE NUT

(For Puller)

Mp/2.3/3.3.1/2.4

FITTING III



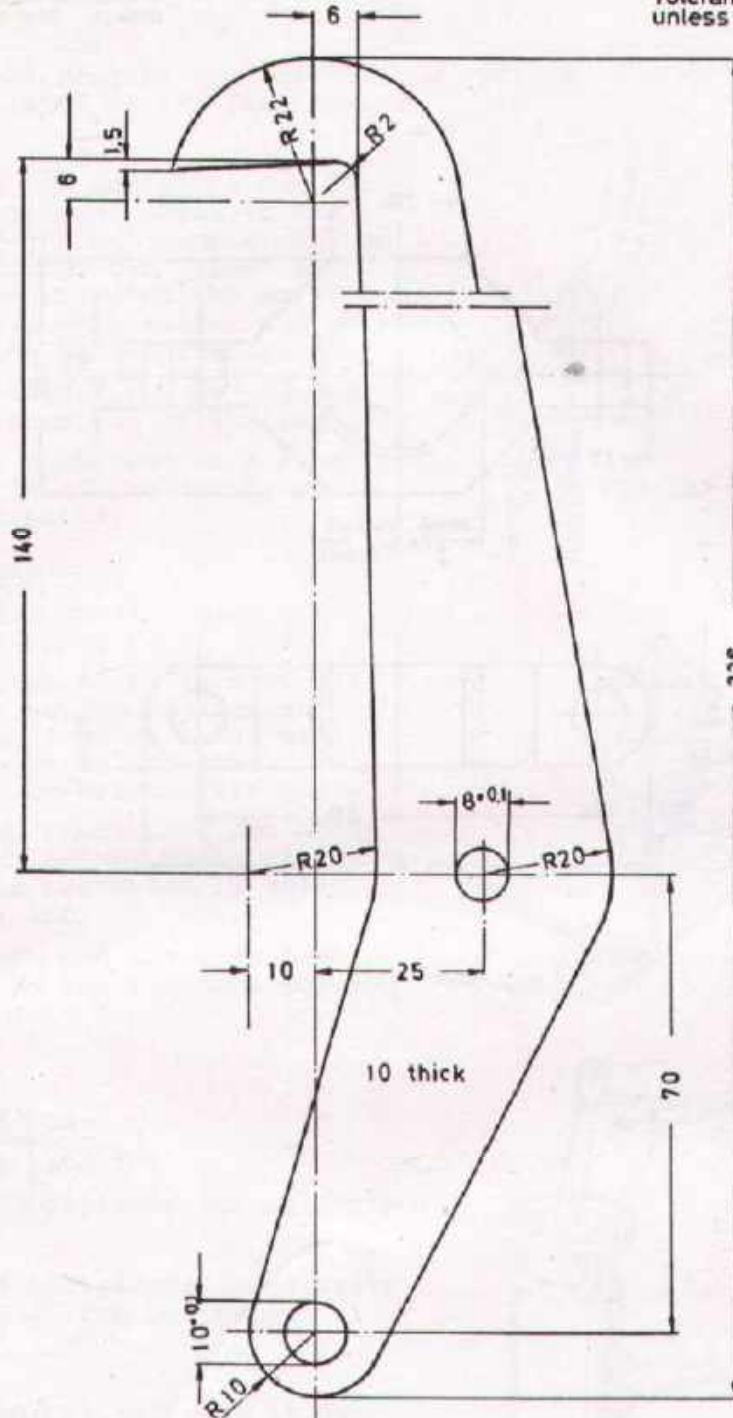
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



5

Tolerance $\pm 0,1$
unless otherwise stated



SCALE 1:1

MAT. MILD STEEL

GRAB HOOK

(For Puller)

Mp/2 . 3/3.3 . 1/25

FITTING III



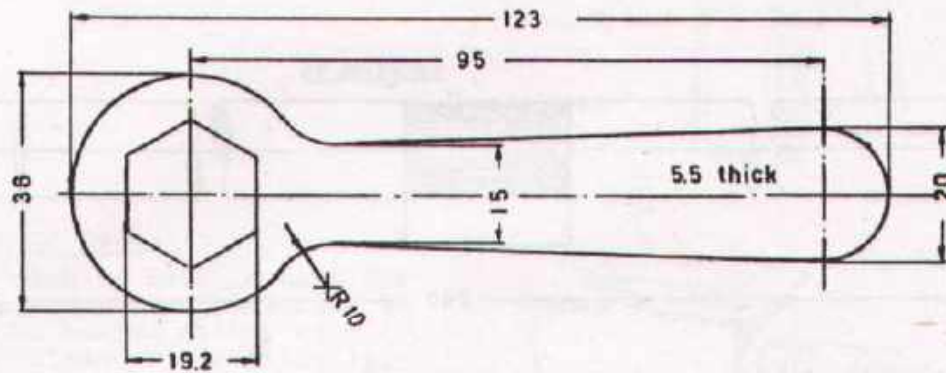
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

6



7 4 Pieces



SIZE	TOLERANCE
8 H7	$\pm 0,015$ 0

SCALE 1:1

MAT. MILD STEEL

PULLER DETAILS

Mp/2.3/3.3.1/26

FITTING III



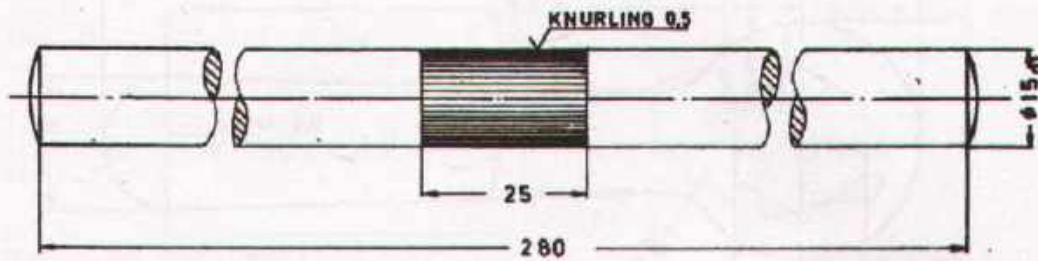
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

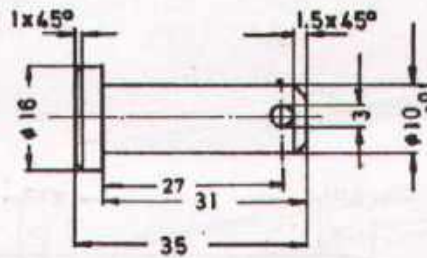


Tolerance ± 0.1
unless otherwise stated

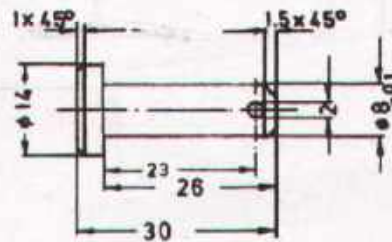
8



9



10



SCALE 1:1

MAT. MILD STEEL

PULLER DETAILS

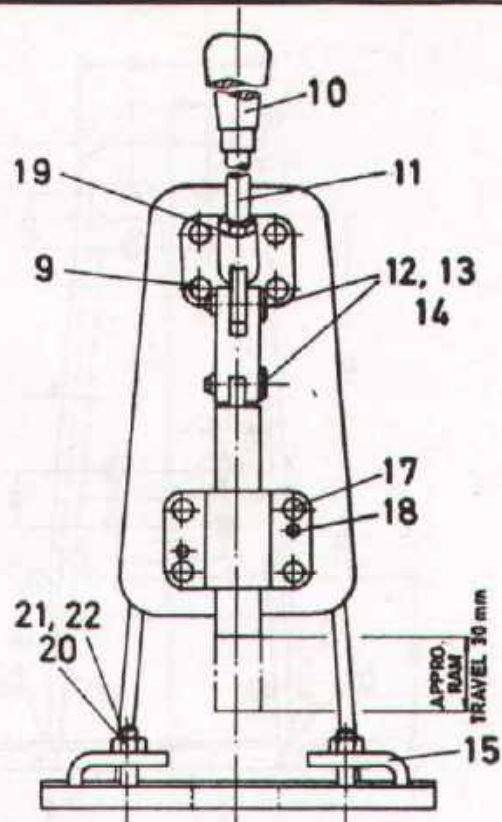
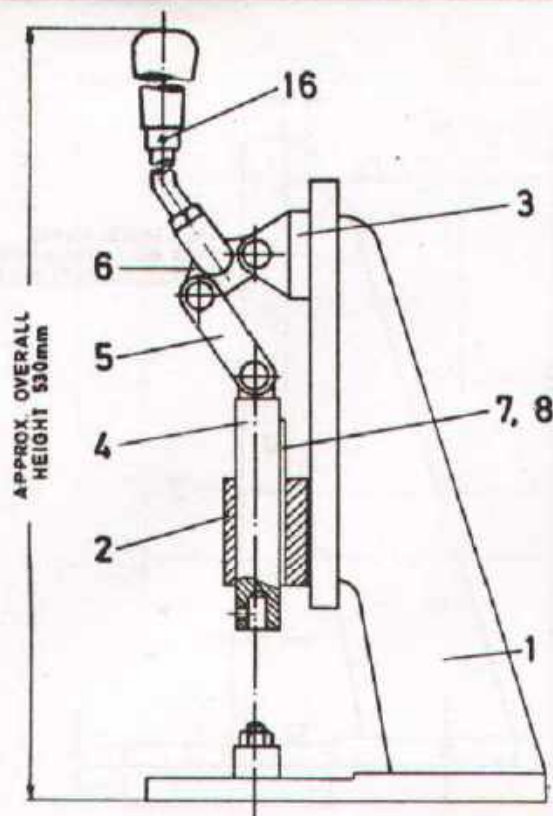
Mp/2.3/3.3.1/27

FITTING III



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



22	2	WASHER ϕ 10.5	
21	2	NUT M 10	
20	2	STUD	DRG. NO. 3.5
19	1	NUT M 12	
18	2	PARALLEL PIN 8x20 mm	
17	4	HEX. SCREW M8x20 mm	
16	1	TAPER PIN 4x20 mm	
15	2	BOLSTER CLIP	DRG. NO. 3.5
14	3	CIRCLIP	SPRING WIRE DIA 1.5 mm
13	3	WASHER	DRG. NO. 3.8
12	3	FULCRUM PIN	DRG. NO. 3.8
11	1	LEVER	DRG. NO. 3.9
10	1	BRASS HANDLE	DRG. NO. 3.8
9	4	HEX. SCREW M8x20 mm	
8	2	SCREW CSK HD M3x12 mm	
7	1	FEATHER KEY	DRG. NO. 3.5
6	1	TOGGLE LINK	DRG. NO. 3.4
5	1	TOGGLE LINK	DRG. NO. 3.3
4	1	RAM	DRG. NO. 3.7
3	1	FULCRUM BRACKET	DRG. NO. 3.2
2	1	FULCRUM BRACKET	DRG. NO. 3.6
1	1	FABRICATED BODY	DRG. NO. 3.1
S. No.	Qty	DENOMINATION	REMARKS

SCALE 1:1

MAT. MILD STEEL

TOGGLE PRESS

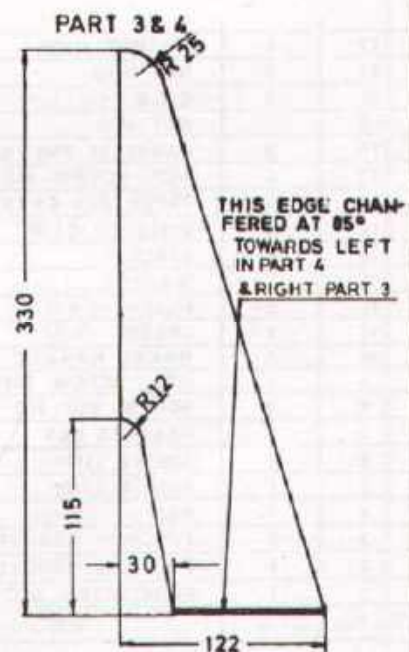
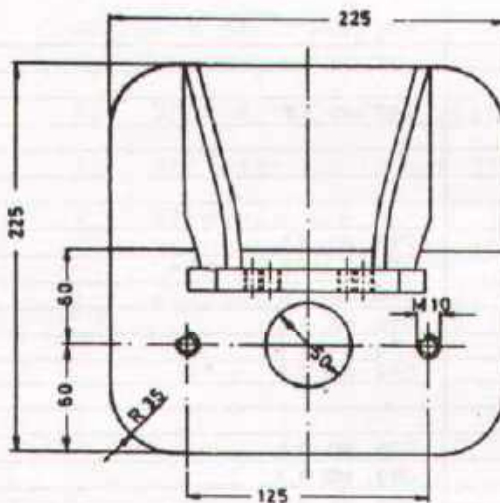
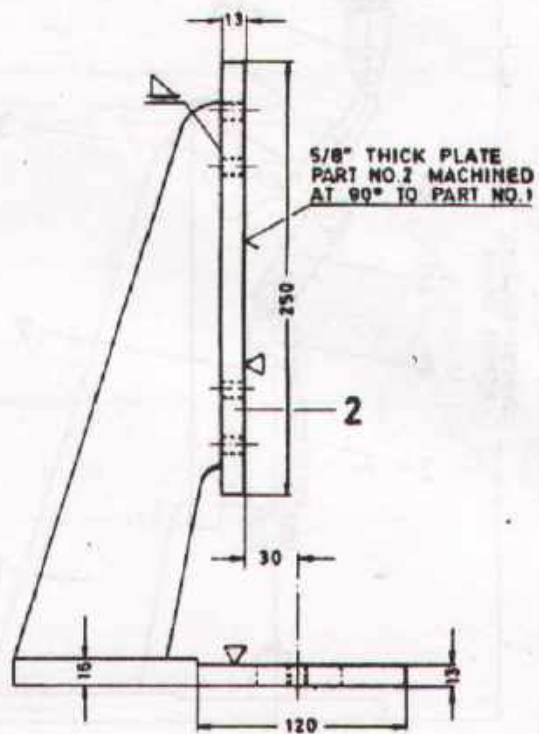
Mp/2.3/3.3.1/3

FITTING III



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

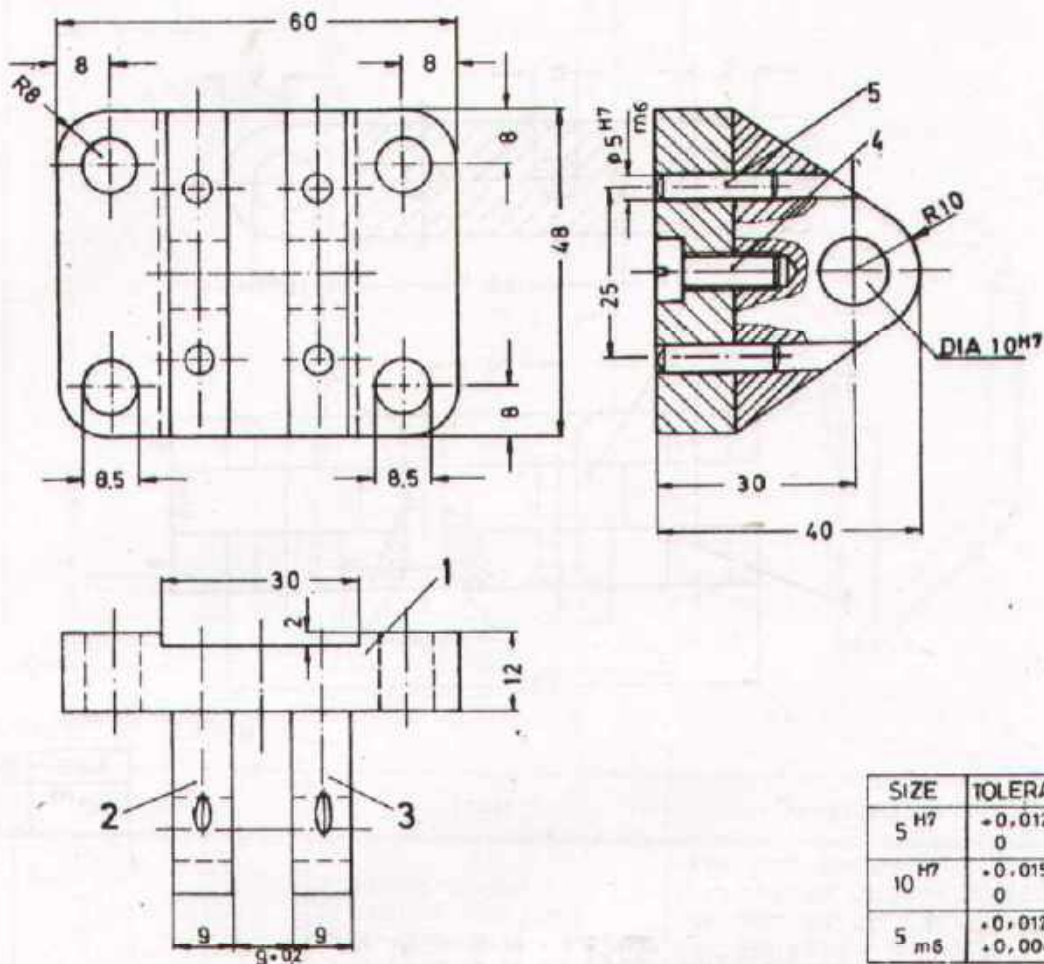


PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

3



SIZE	TOLERANCE
5 H7	+0.012 0
10 H7	+0.015 0
5 m6	+0.012 +0.004

PART 1 = M. S. FLAT 2" x 1/2"
PART 2 = M. S. FLAT 2" x 3/8"
MATERIAL: PART 3 = M. S. FLAT 2" x 3/8"
PART 4 = C.H. SCREW M5 x 18 mm (2 pieces)
PART 5 = PARALLEL PIN $\phi 5 \times 18$ mm (4 pieces)

SCALE 1:1

MAT. MILD STEEL

FULCRUM BRACKET

(TOGGLE PRESS)

Mp/2 . 3/3.3.1/3.2

FITTING III



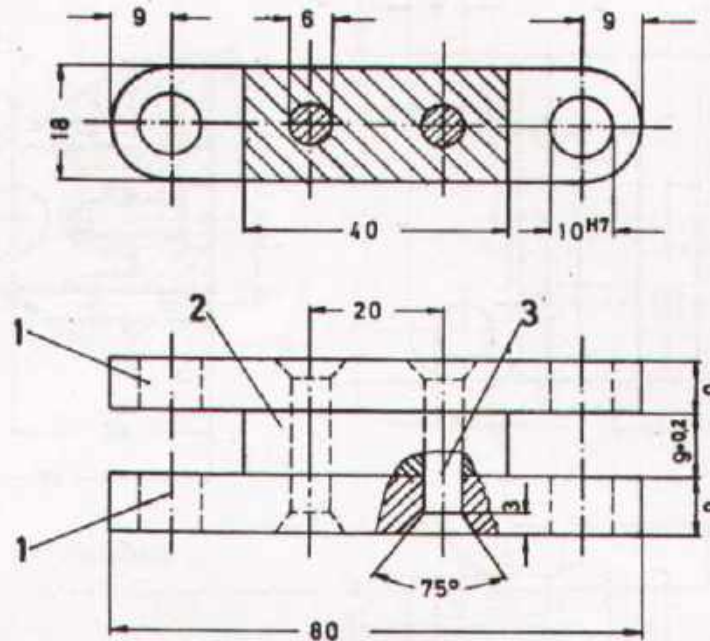
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

5



SIZE	TOLERANCE
10 ^{H7}	+0.015 0

MATERIAL: PART 1 = M. S. FLAT $\frac{3}{8}$ " (2 pieces)
PART 2 = M. S. FLAT $\frac{3}{8}$ "
PART 3 = C. S. H. - RIVET $\phi 6 \times 24$ mm (2 pieces)

SCALE 1 : 1

MAT. MILD STEEL

TOGGLE LINK

Mp/2 . 3/3.3 . 1/3.3

FITTING III



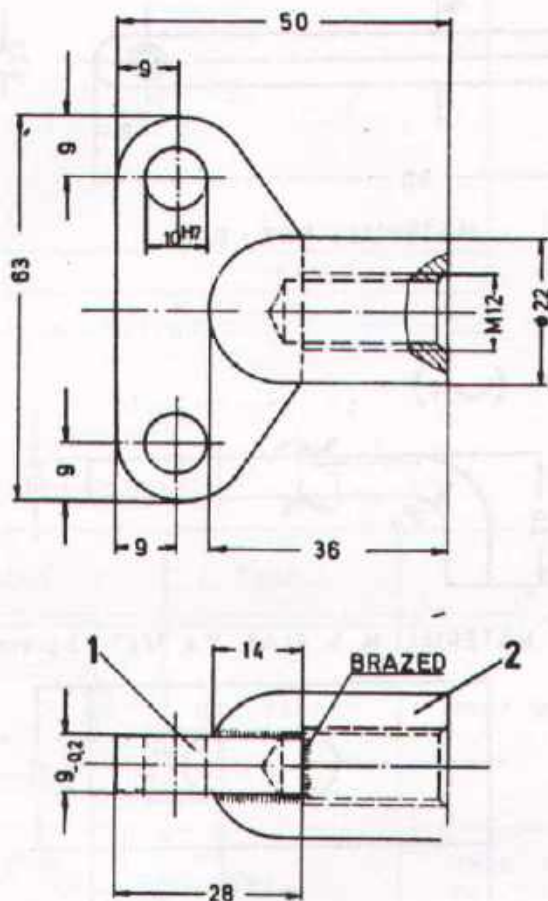
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

6



SIZE	TOLERANCE
10 ^{H7}	+0,015 0

MATERIAL: PART 1 = M. S. FLAT $\frac{3}{8}$ "
PART 2 = M. S. ROUND 1"

SCALE 1:1

MAT. MILD STEEL

TOGGLE LINK

Mp/2 .3/3.3.1/3.4

FITTING III

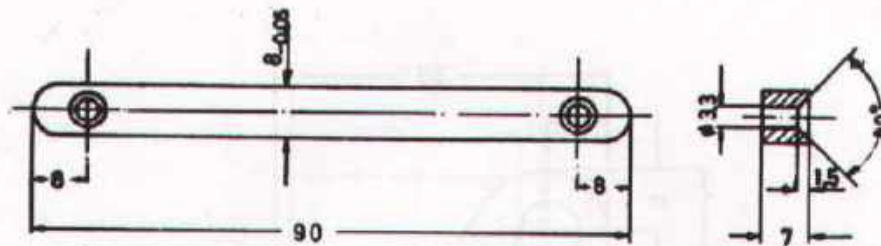


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

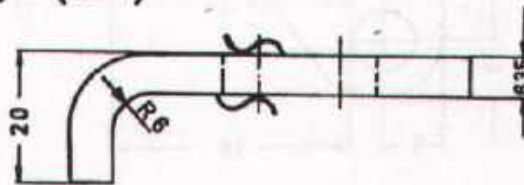
Tolerance ± 0.1
unless otherwise stated

7 $\nabla \nabla$

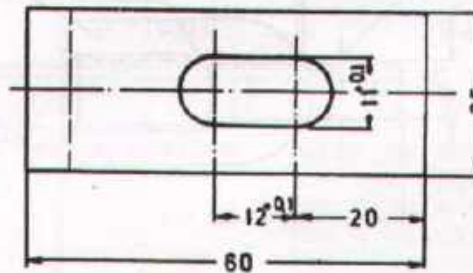


MATERIAL: KEY - BAR

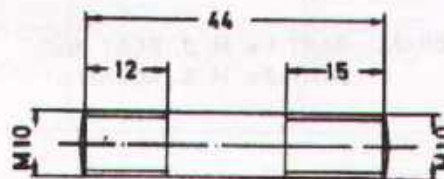
15 $\nabla \nabla$ (~)



MATERIAL: M. S. FLAT 1" x 1/4" (2 pieces)



20 $\nabla \nabla$



MATERIAL: M. S. ROUND 1/2" x 50 mm (2 pieces)

SCALE 1 : 1

MAT. MILD STEEL

TOGGLE PRESS DETAILS

Mp/2 . 3/3.3 . 1/35

FITTING III



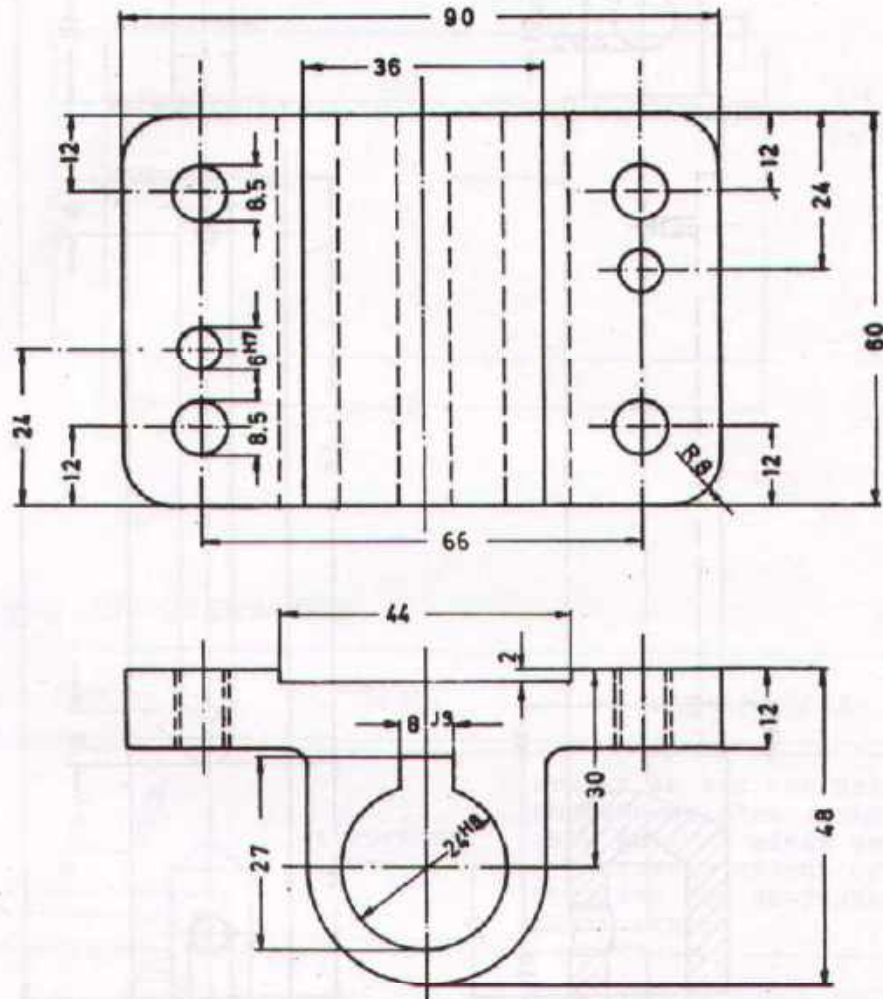
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

2



SIZE	TOLERANCE
6 ^{H7}	+0,012 0
8 ^{J9}	±0,016
24 ^{H8}	+0,033 0

SCALE 1:1

MAT. CAST-IRON

FULCRUM BRACKET

(TOGGLE PR.)

Mp/2 . 3/3.3.1/3.6

FITTING III



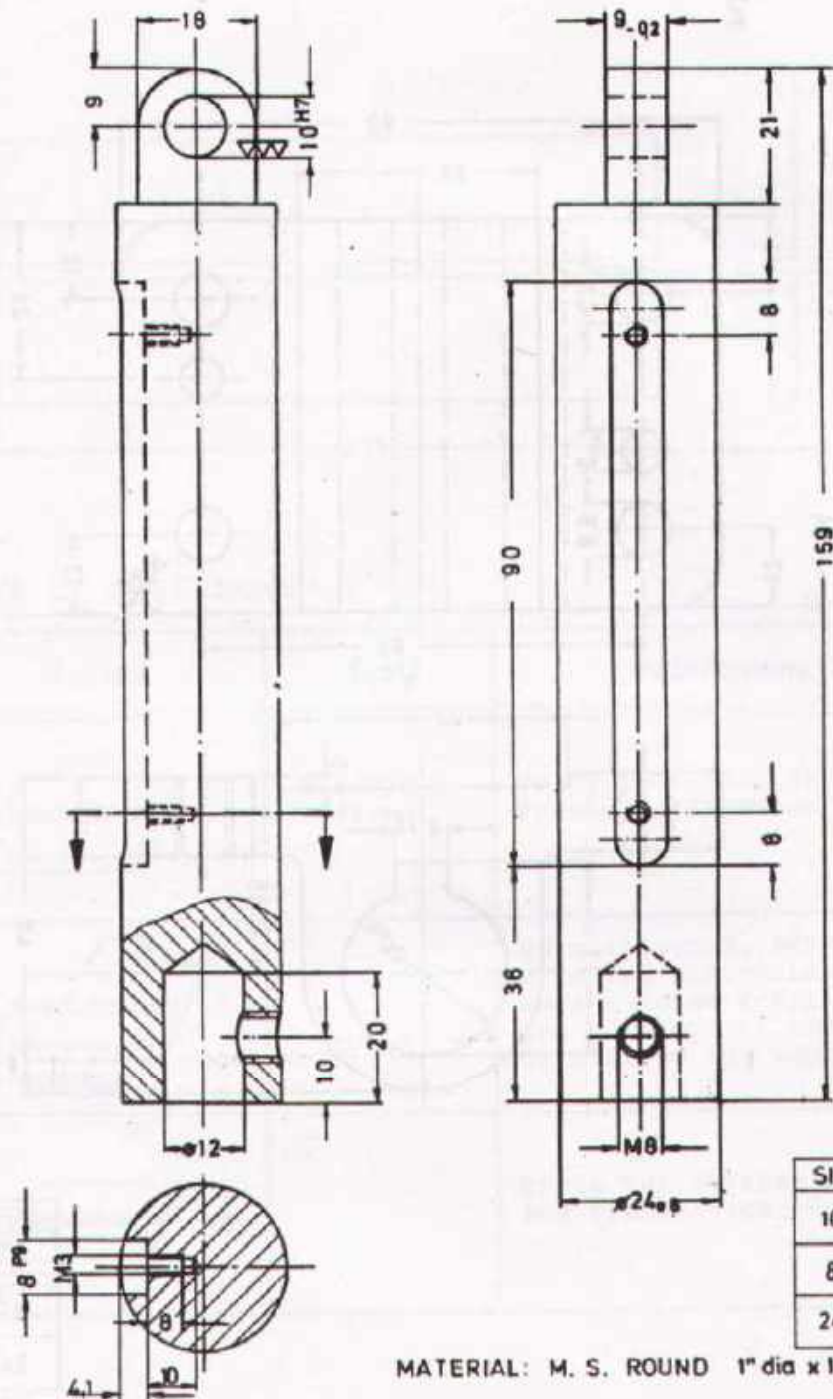
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

W (W)

Tolerance ± 0.1
unless otherwise stated

4



SIZE	TOLERANCE
10 ^{H7}	+0.015 0
8 ^{P9}	-0.015 -0.051
24 ^{e8}	-0.040 -0.073

MATERIAL: M. S. ROUND 1" dia x 165 mm

SCALE 1:1

MAT. MILD STEEL

from 23.4/73

RAM

TOGGLE PR.

Mp/2 . 3/3.3 . 1/37

FITTING III



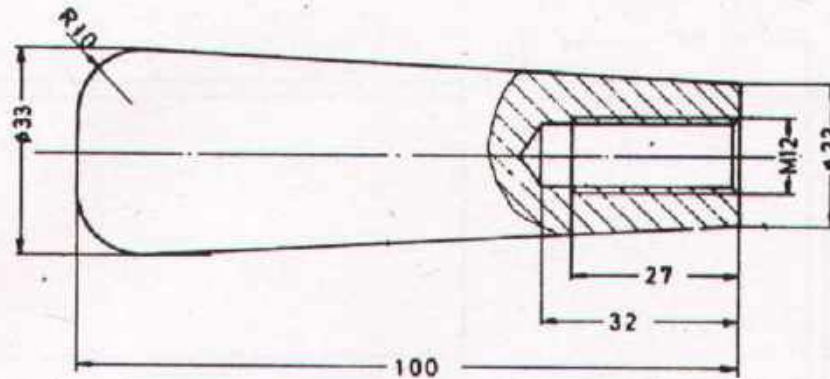
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



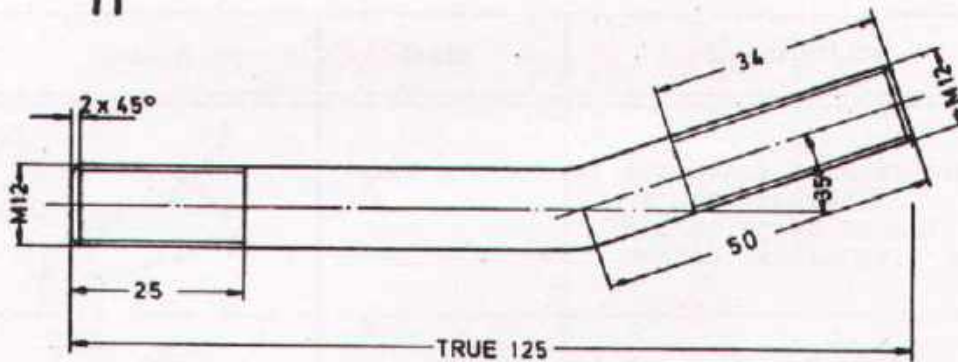
Tolerance ± 0.1
unless otherwise stated

10



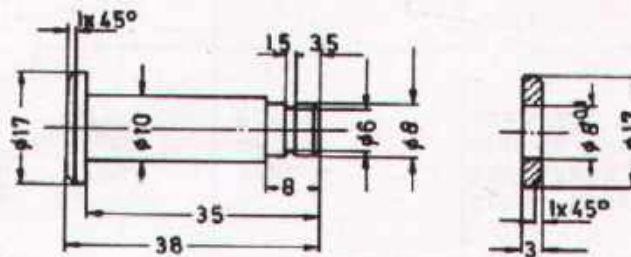
MATERIAL: BRASS ROUND $1\frac{1}{2}$ " dia x 105 mm

11



MATERIAL: M. S. ROUND $1\frac{1}{2}$ " dia x 130 mm

12,13



M. S. ROUND $\frac{3}{4}$ " (3 pieces each)

SCALE 1:1

MAT.

TOGGLE PRESS DETAILS

from 234/14

Mp/2 . 3/3.3 . 1/3.8

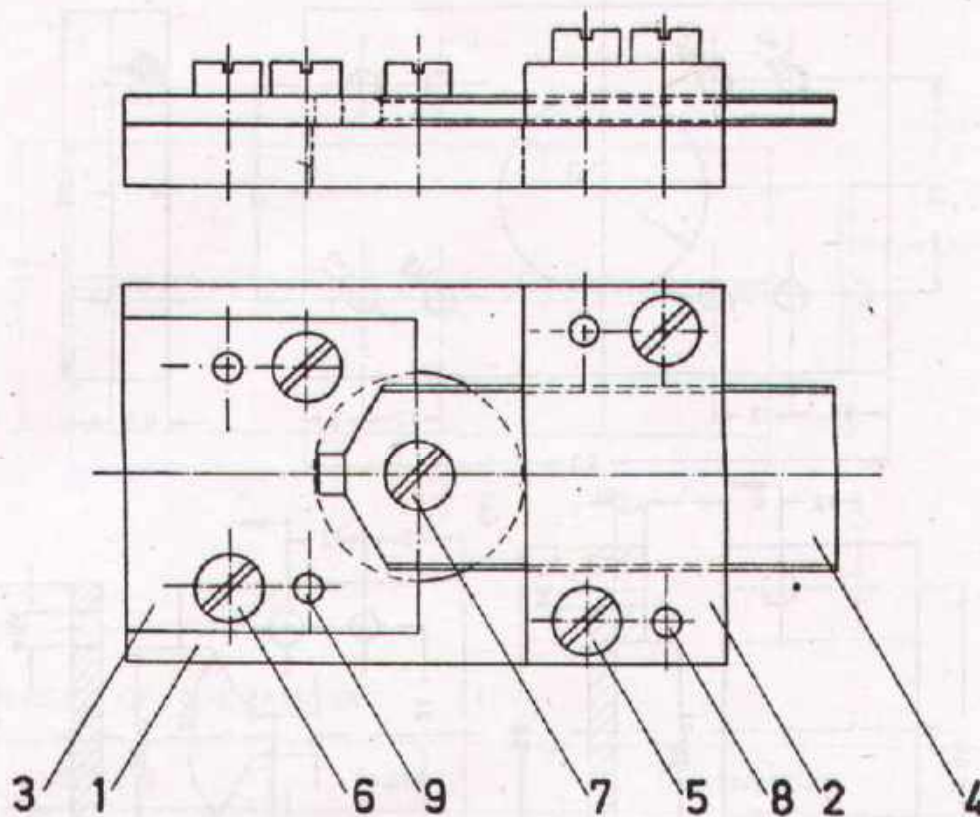
FITTING III



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

FITTER
MILLWRIGHT



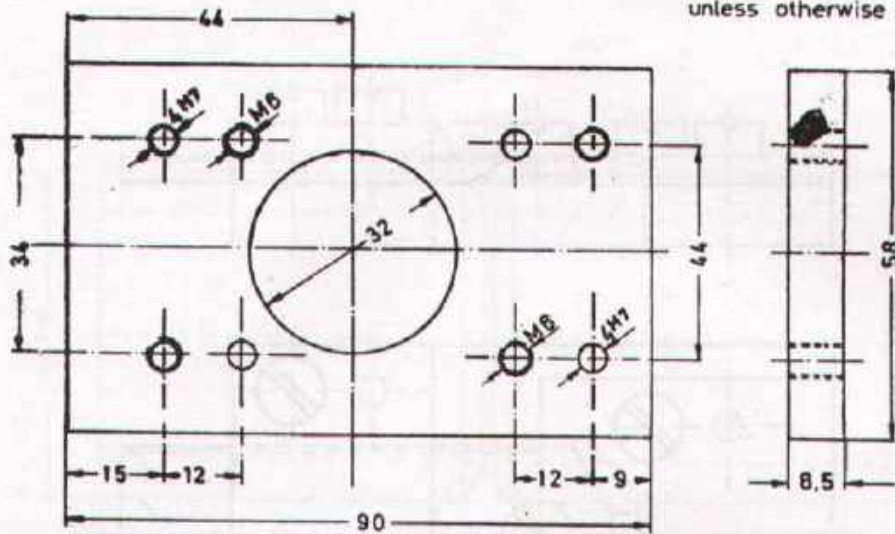
PRORATED TIME: 10 hrs.

9	2	PARALLEL PIN 4x 13	
8	2	PARALLEL PIN 4x 17	
7	1	CHEESE HEAD SCREW M6x 5 mm	
6	2	CHEESE HEAD SCREW M6x 12 mm	
5	2	CHEESE HEAD SCREW M6x 16 mm	
4	1	BOLT 30 x 45 x 76	
3	1	STOP 50 x 45 x 48	DRILLED WITH PART 1
2	1	BRIDGE 60 x 85 x 32	DRILLED WITH PART 1
1	1	BASE PLATE 60 x 85 x 92	DRILLED WITH PART 2 & 3
P.-NO.	QTY.	DENOMINATION	REMARKS
SCALE 1 : 1		SLIDE FITTING	Mp/2.3/3.3.1 / 4
MAT. MILD STEEL			TEST
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING			
PAK-GERMAN TECHNICAL TRAINING PROGRAMME			

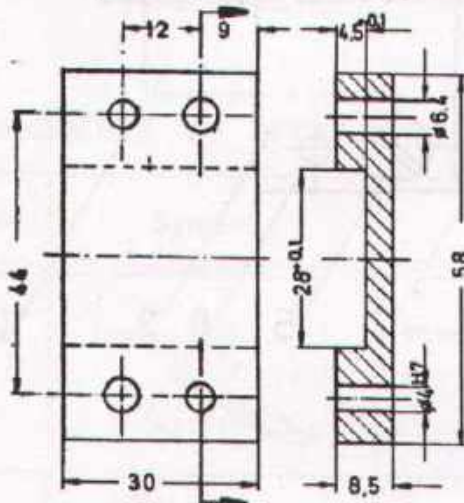


Tolerance $\pm 0,1$
unless otherwise stated

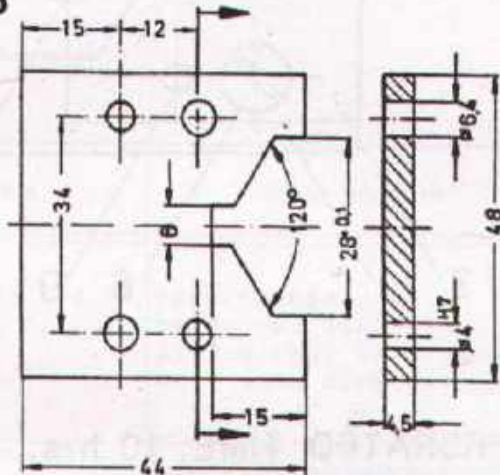
1



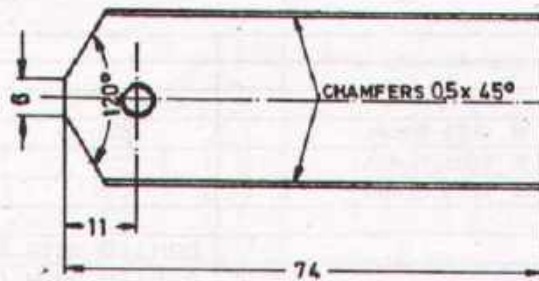
2



3



4



SIZE	TOLERANCE
H7	+0,012
0	0

SCALE 1:1

MAT. MILD STEEL

SLIDE FITTING

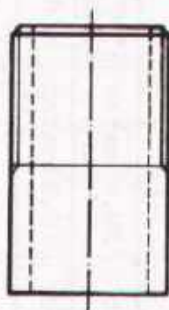
Mp/2.3/3.3.1/4.1

TEST



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



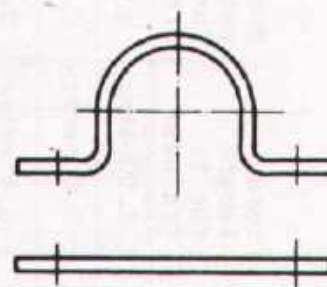
Threading, Sawing

1



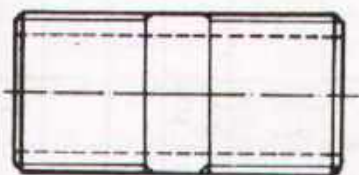
Threading, Sawing

2



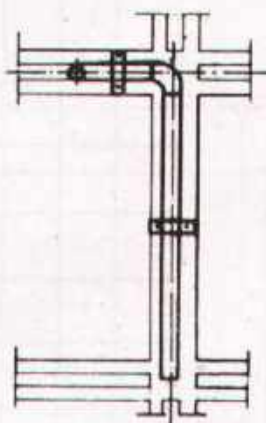
Bending

3



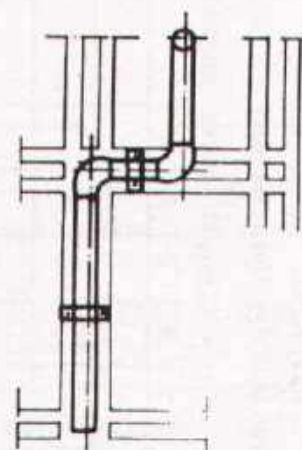
Threading, Sawing, Filing

4



Fitting of pipes

5



Fitting of pipes

6

TRADE TRAINING II

LAYOUT

MP/2.1/3.3.2/

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TRADE TRAINING II

FITTING III

No. 3.3.1/4. (Test)

Exercise No. (Length given in mm)

1	2	3	4	5	6	7	8	9
95								
	63							
		50						
			80					

MATERIAL REQUIRED

FITTER GENERAL / MILLWRIGHT

	Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
M.S.Flat 60x9.6 mm (2 3/8" x 3/8")	95 mm	1.55meter	6.9 kg
M.S.Flat 32x9.6 mm (1 1/4" x 3/8")	63 mm	1.0 meter	2.5 kg
M.S.Flat 50 x 6 mm (2" x 1/4")	50 mm	0.8 meter	2.1 kg
M.S.Flat 30 x 6 mm (1 3/16" x 1/4")	80 mm	1.3 meter	2.0 kg
	Total Nos. per Trainee	Total Nos. for 16 Trainees	
M.S.Cheese HD. Screw M 6 x 16 mm	2 Nos.	36 Nos.	
M.S.Cheese HD. Screw M 6 x 12 mm	2 Nos.	36 Nos.	
M.S.Cheese HD. Screw M 6 x 5 mm	1 NO.	18 Nos.	
M.S.Parallel Pin Ø 4 x 17 mm	2 Nos.	36 Nos.	
M.S.Parallel Pin Ø 4 x 13 mm	2 Nos.	36 Nos.	

PIPE FITTING

No. 3.3.2/ 1 to 6

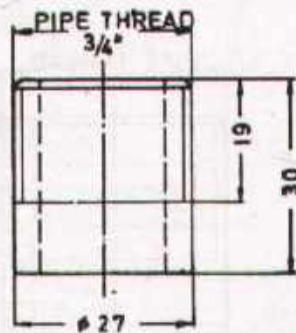
1	2	3.1	3.2	4	5	6
32				52	500 250	500 500
	34					
		136 148	92 92			

	Length in running m	
G.I.Pipe 3/4"	1834 mm	29.4 meter
G.I-Pipe 1"	34 mm	0.55meter
M.S.Sheet 13 SWG 2x25mm (2 pieces)	468 mm	7.5 meter
G.I.Elbow 3/4"	3 Nos.	48 Nos.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Check the quality of the pipe.
(Correct weld seam? Properly galvanized? Diameter accurate?)
2. Thread the pipe, mind the length of the thread.
3. Cut the pipe and deburr it.

TOOLS REQUIRED

Measuring and marking tools

Threading die

Hacksaw

Flat file 200 x 3

Round file 200 x 3

CAUTION

NEVER THREAD WITHOUT OILING !

SCALE 1:1

MAT. G.I. PIPE

THREADING EXERCISE

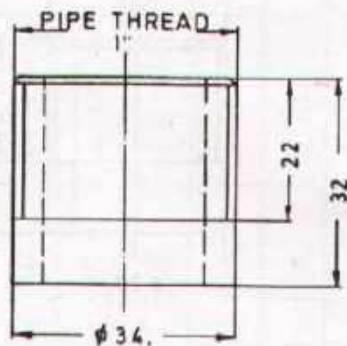
Mp/2.3/3-3-2/1

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Check the quality of the pipe as done before.
2. Thread the pipe, mind the length of the thread.
3. Cut the pipe and deburr it.

TOOLS REQUIRED

Measuring and marking tools

Threading die

Hacksaw

Flat file 200 x 3

Round file 200 x 3

CAUTION

NEVER THREAD WITHOUT OILING !

SCALE 1:1

MAT.G.I PIPE

THREADING EXERCISE

Mp/2.3/3-3.2/2

PIPE FITTING

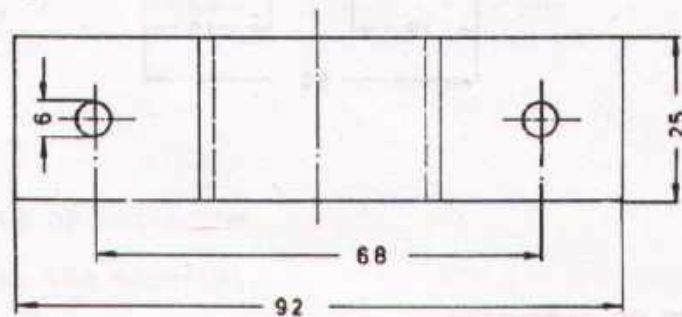
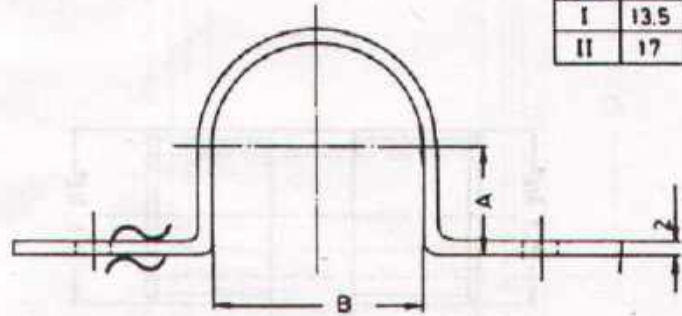


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

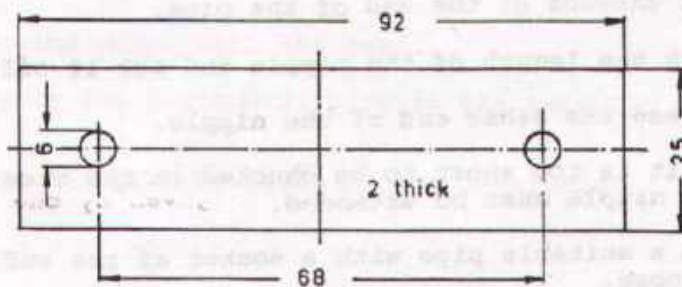
1.2 W. (~)

	A	B
I	135	27
II	17	34



2

TWO PIECES EACH



SEQUENCE OF OPERATION

1. Calculate the stretched length of part 1.
2. Mark both parts, cut and deburr the material.
3. Bend part I according to drawing. Drill the holes.
4. Drill the holes in part I.

SCALE 1:1

MAT. G I. PIPE

CLAMPS

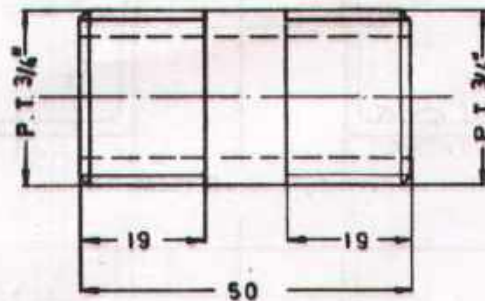
Mp/2.3/3-3.2/3

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Cut threads at the end of the pipe.
2. Mark the length of the nipple and cut it off.
3. Thread the other end of the nipple.

As it is too short to be chucked in the vice directly the nipple must be extended.

Use a suitable pipe with a socket at the end for this purpose.

SCALE 1:1

MAT. G.I. PIPE

DOUBLE NIPPLE

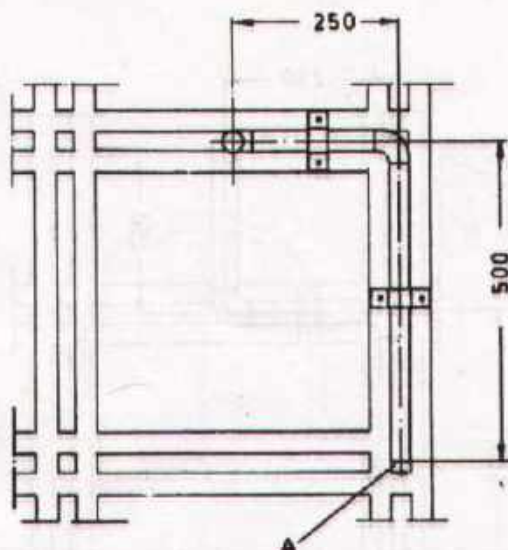
Mp/2.3/3.3.2/4

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Check the material.
2. Cut the pipes to the length. Deburr the pipes and cut the thread.
3. Join the pipes with the bend.
4. Prepare the horizontal pipe in the same way and join it.
5. Point 'A' will be given by the Instructor.

CAUTION

The threads of fittings and pipes are slightly tapered. If the thread is cut properly it should be possible to screw 80 % of the threaded portion into a fitting by hand.

SCALE 1:10

MAT: G.I. PIPE

WATER PIPE INSTALLATION

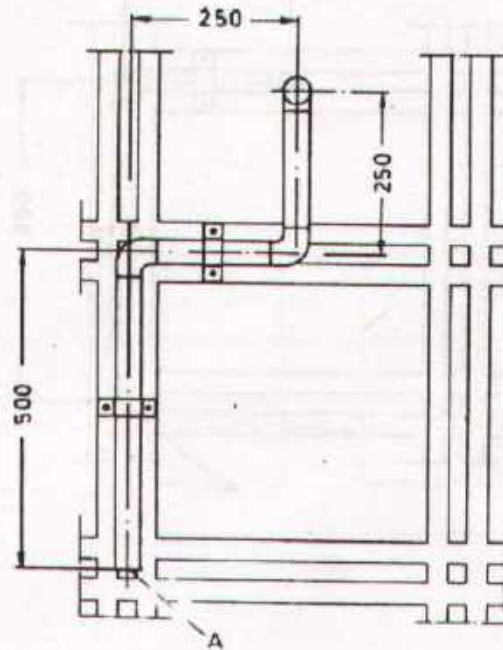
Mp/2.3/3-3.2/5

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Start the work from point A given by the Instructor.
2. Prepare the 3 pieces in the proper sequence and join them with the bends.
3. Fix the pipe line with clamps on the wall.
4. Check finally if all dimensions correspond with the drawing.
5. Check the position of the last bend using pipe nipple and level.

CAUTION

The cut edges of the pipe must be deburred inside and outside.

SCALE 1:10

MAT. GLPIPE

WATER PIPE INSTALLATION

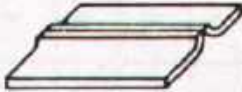
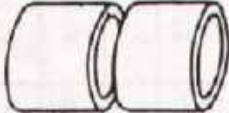
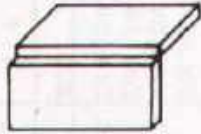
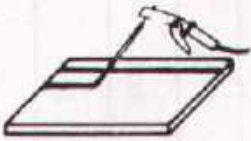
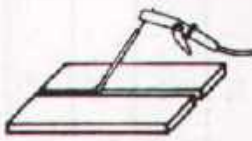
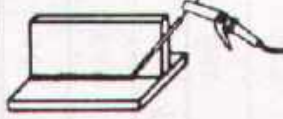
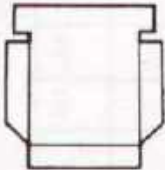
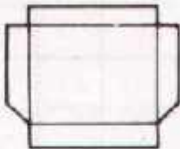
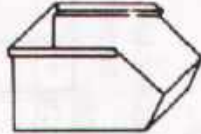
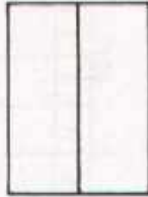
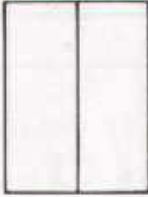
Mp/2.3/3.3.2/6

PIPE FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

WELDING / 1.1/2.0.2/1-4			
 Blind weld Square butt weld 1-2	 Double flanged butt weld 3	 Pipe butt weld 4	 Corner weld 5
WELDING / 1.3/3.3.2/1-4			
 Blind welding 1	 Butt welding 2	 Fillet welding 3	 Tube and plate welding 4
SHEET METAL 1.1/ 2.3.5			
 1	 2	 3	 4
INFORMATION AND INSTRUCTIONSHEETS a_b-c-d	SOLDERING 2.1/ 2.6.4		
	 Lap joint 1	 Butt joint 2	
	BRAZING 2.1/ 2.6.4		
 Lap joint 6	 Butt joint 7	 Butt joint at an angle 8	
LAYOUT			Welding Sheet Metal Soldering & Brazing
 DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME			

TRADE TRAINING II

Welding Sheet Metal
Soldering & BrazingNo. 2.0.2 / 2.4.5/2.6.4
3.3.2

MATERIAL REQUIRED

FITTER GENERAL / MILLWRIGHT

SOLDERING
& BRAZING

SHEET METAL

GAS

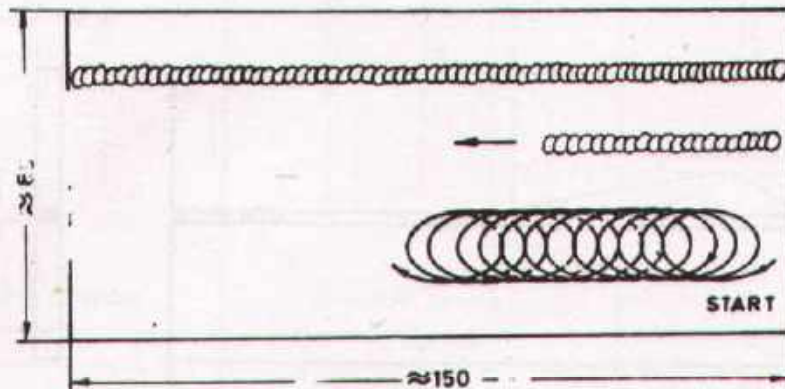
SOLDERING
& BRAZING

Welding Sheet Metal Soldering & Brazing 2.0.2 / 2.4.5/2.6,4 No. 3,3,2		FITTER GENERAL / MILLWRIGHT																Length per Trainee M/Meter	Total length for 16 Trainees Meter	Total weight for 16 Trainees K.G.		
		GAS					ARC					SHEETMETAL SOLDERING & BRAZING										
		1	2	3	4	5	1	2	3	4	1-1	1-2	1-3	1	2	6	7				8	
M.S.Sheet 80x1mm (3 1/4"x19 S.W.G.)	150																	150	0.2 Sgm.	1.6		
M.S.Sheet 50x2-3mm (2"x10 S.W.G.)		120															250	125	125	620	0.5 Sgm.	12.5
M.S.Sheet 60x1-1.5mm (2 3/8"x15 S.W.G.)			150															150	0.15 Sgm.	2.0		
G.I.PIPE ϕ 2"				100														100	1.6 m	5 1/2ft		
M.S.Flat 40x3mm (1 3/4"x1/8"2pcs)					250													250	0.16 Sgm.	4.0		
M.S.Flat 75x6mm (3" x 1/4")						125												125	2.0 m	7.2		
M.S.Flat 25x4mm (1"x3/16"2pcs)							250											250	4 m	3.5		
M.S.Flat 50x6mm (2"x1/4")								125										125	2 m	5.0		
M.S.Flat 40x6mm (1 1/2"x1/4")									125									125	2 m	4.0		
M.S.Flat 70x6mm (3"x1/4")										75								75	1.2 m	4.2		
M.S.Pipe ϕ 1 1/2"										35								35	0.6 m	2.0ft		
M.S.Sheet 120x0.63mm (4 3/4"x22 S.W.G.)												110	-	65				175	0.35 Sgm.	2.0		
M.S.Sheet 150x0.63mm (6"x22 S.W.G.)													300					300	0.75 Sgm.	3.9		
M.S.Flat 50x1 mm (2"x19 S.W.G.2pcs)																132	132		0.22 Sgm.	1.9		



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1	A  B  C 	TORCH O, 5-1	LIGHT THE TORCH AND ADJUST IT FOR A NEUTRAL FLAME A=NEUTRAL THE INNER CONE IS SHARP AND CLEAR VISIBLE.
2			KEEP THE TORCH IN A POSITION BETWEEN 40 - 60°. HOLD THE TIP OF THE CONE ≈ 2 MM ABOVE THE WORK.
3			MOVE THE TORCH CLOCKWISE. HOLD THE FLAME IN ONE SPOT UNTIL A PUDDLE OF METAL ≈ 4 - 6 ϕ IS FORMED.

SCALE 1:1

MAT. MILD STEEL

BLIND WELD

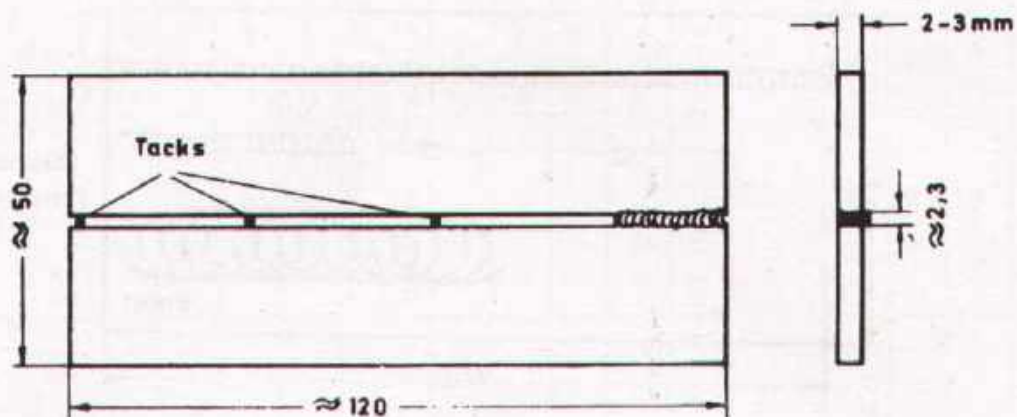
No. MP1. /2.0.2/1

GAS WELDING 1

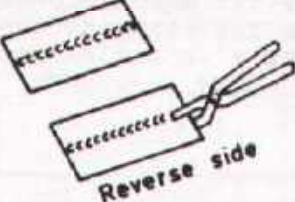


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Description
1		TORCH 2 - 4 ROD ϕ 2 - 2,5	MOVE THE ROD RHYTHMICALLY UP AND DOWN. DIP THE END INTO THE MOLTEN PUDDLE. TORCH MOVEMENT NEARLY ROTATING. ENSURE COORDINATION WITH ROD.
2			TRY TO MAKE AN EQUAL WELD-BED BY HEIGHT AND SIZE. INSPECT REVERSE-SIDE FOR GOOD PENETRATION.

SCALE 1:1

MAT. MILD STEEL

SQUARE BUTT WELD

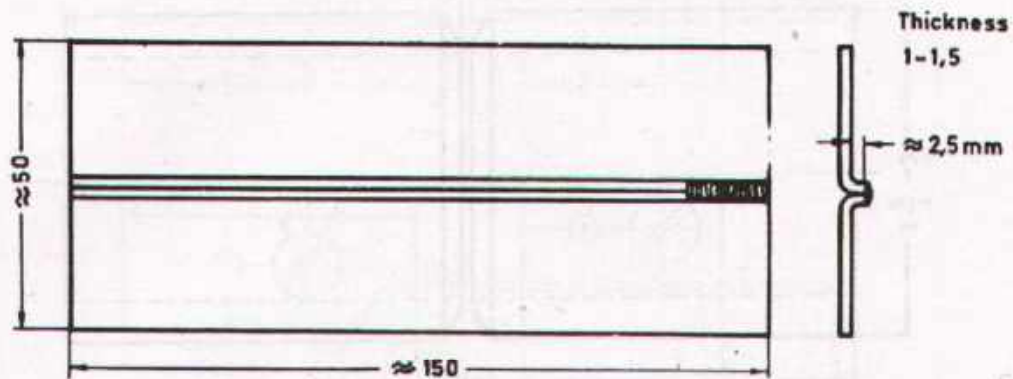
No. MP'1. /2.0.2/2

GAS WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		TORCH 1 - 1,5	MAKE TACK-WELDS TO HOLD THE WORK IN PLACE DO IT CORRECTLY (HEAT WILL EXPAND THE MATERIAL)
2			MOVE THE TORCH CLOCKWISE. MELT THE FLANGE AND DISTRIBUTE IT WITH THE PRESSURE OF THE FLAME. PAY UTMOST ATTENTION TO CORRECT PENETRATION.

SCALE 1:1

MAT. MILD STEEL

FLANGED BUTT WELD

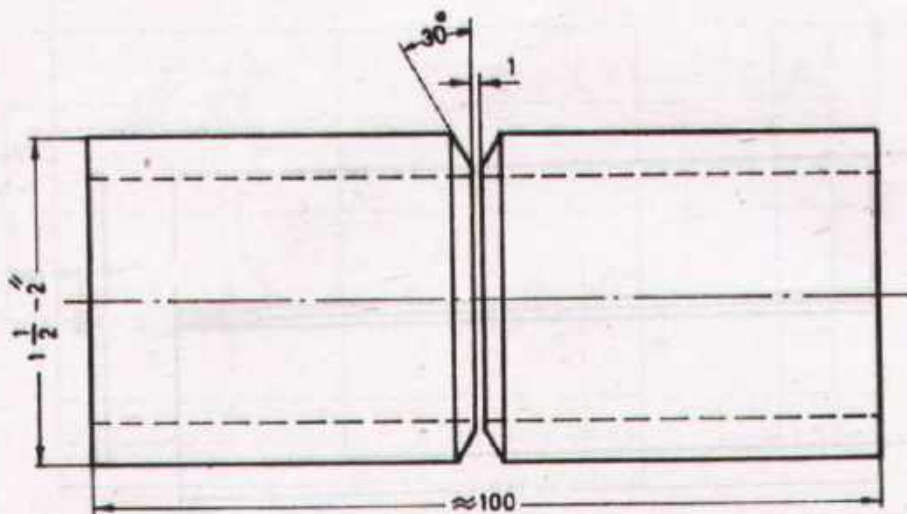
No. MP 1. /2.0.2/3

GAS WELDING I

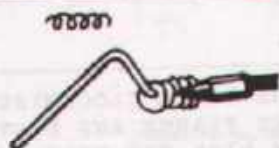


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		TORCH 4 - 6 ROD 4 th	TACK WELDING. BRING THE TORCH IN A POSITION THAT THE FLAME WILL HEAT BOTH SIDES EQUALLY.
2			USE THE ROD TO STIR UP THE MOLTEN MATERIAL. ROD SHOULD BE MELTED ONLY IN THE MOLTEN MATERIAL OF THE WORKPIECE, EXCEPT WHEN STARTING.
3			ROTATE THE PIPE SECTION-WISE THAT YOU ARE ALWAYS IN A GOOD WELDING POSITION. INSPECT PIPE INSIDE.

SCALE 1:1

MAT. MILD STEEL

PIPE BUTT WELD

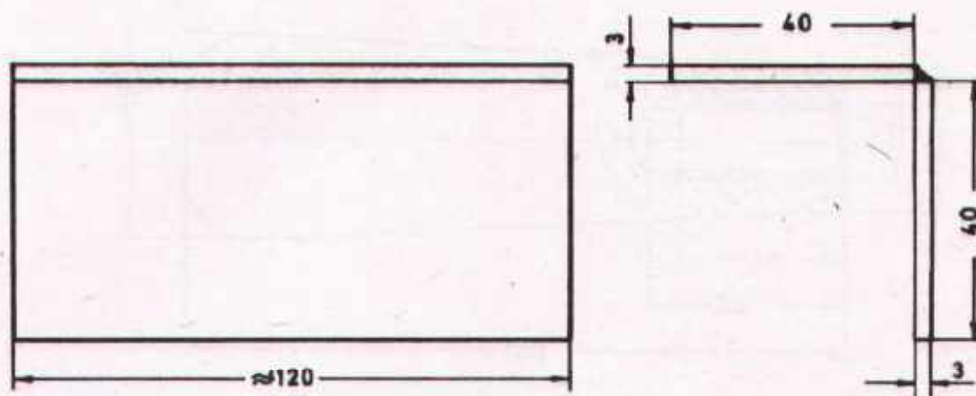
No. MP1. /2.0.2/4

GAS WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



No.	Symbol	Tools	Descriptions
1		TORCH 2 - 4	1) WELD THIS WITHOUT ROD (FLUSH WELDING) EXCESS EQUAL TO MATERIAL THICKNESS.
2		ROD 3 ⁶	2) USE A ROD FILL UP THE ANGLE (CORNER). ENSURE THAT THE ROOT HAS BEEN MOLTEN.
3		ANVIL PLIER HAMMER	TEST THE WELD BY HAMMERING ON THE BEAD UNTIL THE PLATE LIES PERFECTLY FLAT. BREAK IT THEN.

SCALE 1:1

MAT. MILD STEEL

CORNER WELD

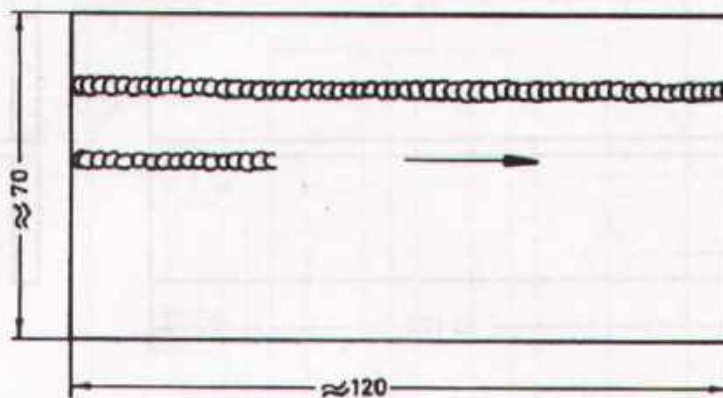
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GAS WELDING I



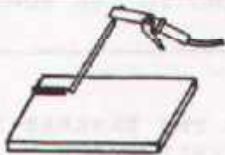
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



4-6 mm
Thickness

SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	STRIKE AN ARC AND RUN A CONTINUOUS BEAD (WELD) FROM LEFT TO RIGHT END. A PREFERRED METHOD OF STRIKING FOR BEGINNERS IS SHOWN LEFT.
2			KEEP THE DISTANCE BETWEEN ELECTRODE AND MATERIAL CONTINUOUSLY EQUAL. OTHERWISE THE ARC FINISHES.

SCALE 1:1

MAT. MILD STEEL

BLIND WELD

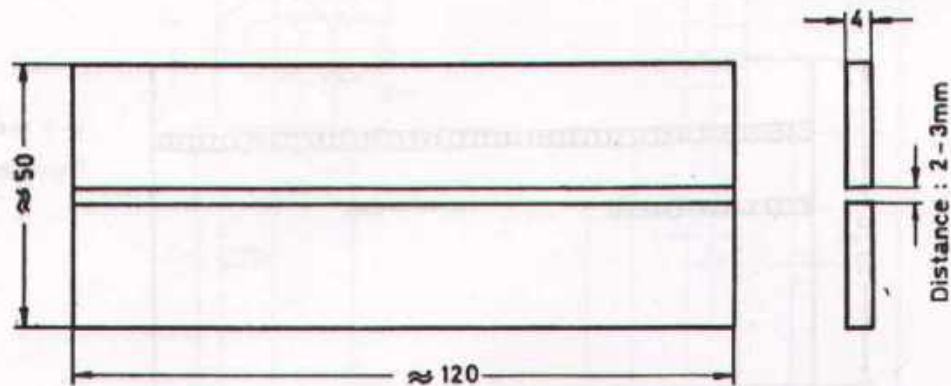
No 3.3.2/1

ARC WELDING I

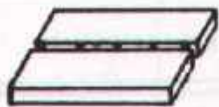


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS.

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	START TACK-WELDING TO PREVENT DISTORTION
2			MOVE SLIGHTLY, ROTATING WITH THE ELECTRODE. THIS ENSURES EQUAL MELT- ING OF MATERIAL AND WELDING TO THE ROOT.
3			CHECK THE REVERSE SIDE FOR PENETRATION.

SCALE 1:1

MAT. MILD STEEL

SQUARE BUTT WELD

No.3. 3.2/2

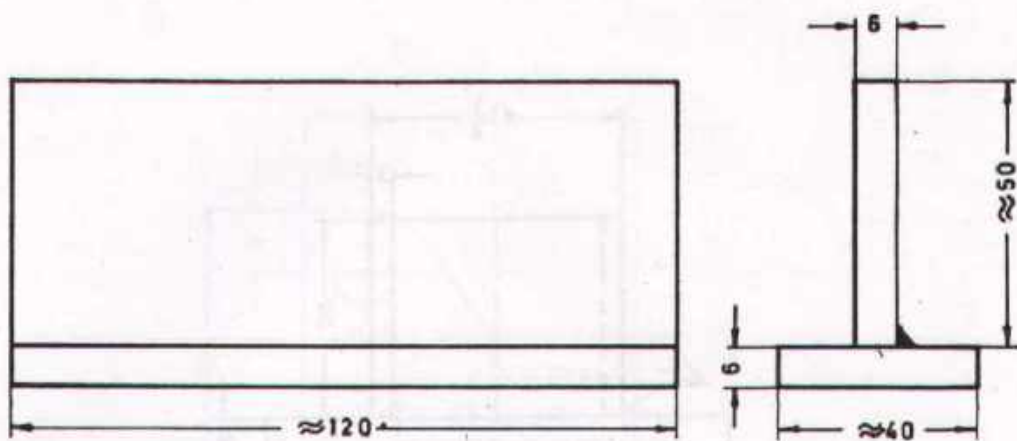
ARC WELDING I



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

2



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE Ø 4	TACK WELDING
2			WELD ONLY ONE SIDE. TRY TO GO AS DEEP AS POSSIBLE BY MELTING THE MATERIAL
3			CHECK IT BY BREAKING THE WELD

SCALE 1:1

MAT. MILD STEEL

FILLED WELD (horizontal)

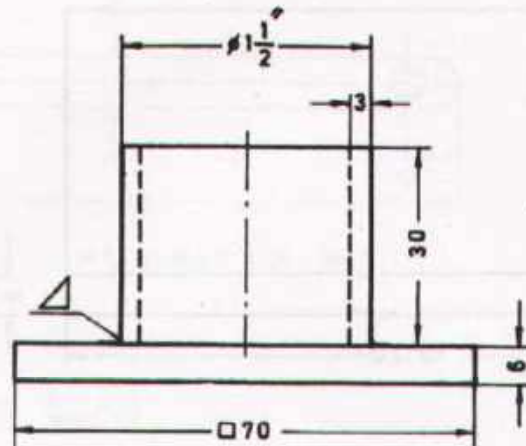
No. 3.3.2/3

ARC WELDING 1

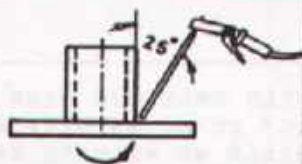


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		ELECTRODE 3.25 mm	KEEP IN MIND THE POSITION OF THE ELECTRODE WHEN WELDING A THIN WALLED PIPE TO A THICKER FLAT PLATE.
2			THE WELD MUST BE EQUAL AND WITHOUT INTERRUPTION. CURRENT AND SPEED MUST BE PROPERLY ADJUSTED.

SCALE 1:1

MAT. MILD STEEL

TUBE ON PLATE WELD

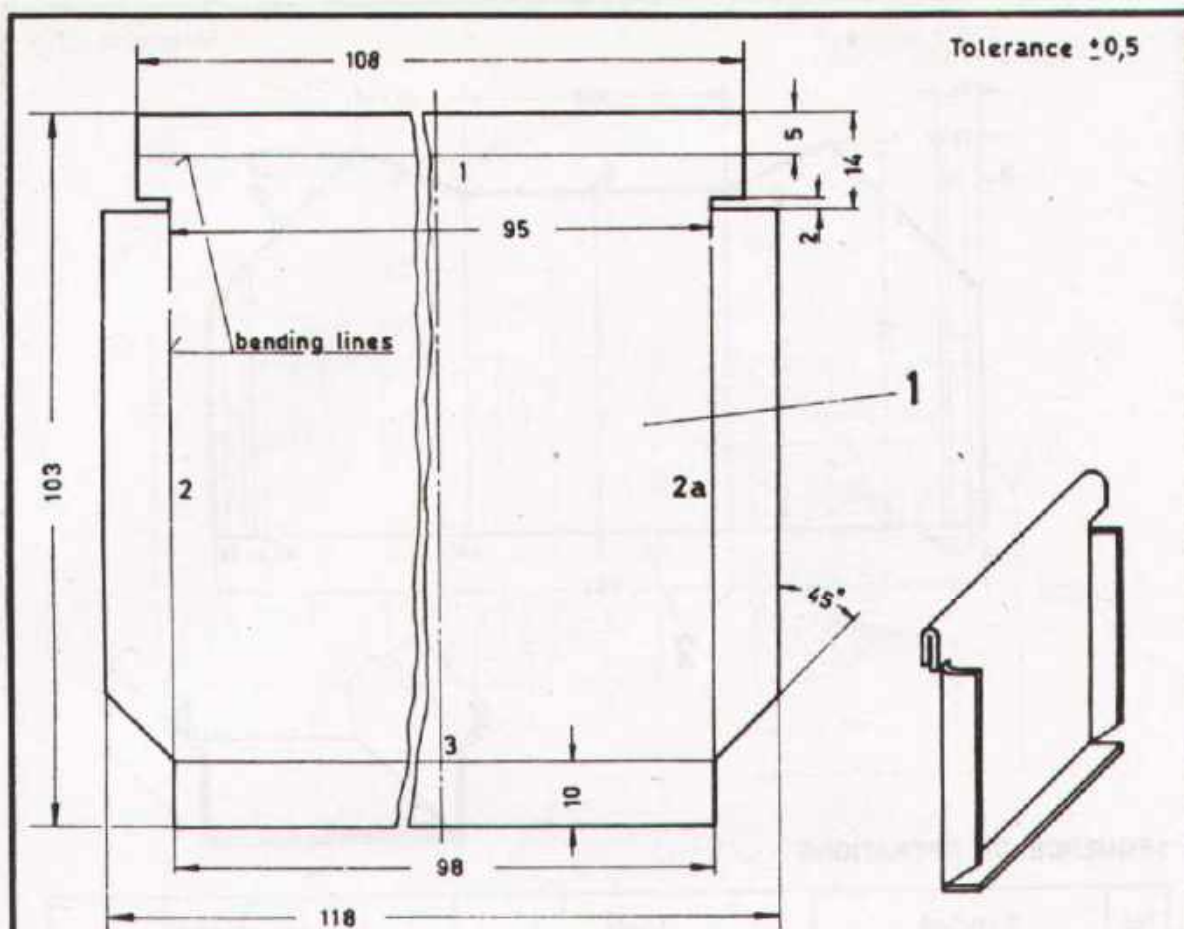
No. 3.3.2/4

ARC WELDING 1

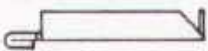


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS SHEARING MACHINE HAND SHEARS	MARK THE SHEET (LINE "1" AT THE BACKSIDE) CUT THE OUTER LINES ON THE SHEARING MACHINE & THE CORNERS WITH THE HELP OF HAND SHEARS.
2		BENDING MACHINE	FOLD THE SHEET AT LINE "1"
3		BENDING MACHINE TRY SQUARE	BEND THE SHEET AT LINES 2, 2a AND 3 TO THE OPPOSITE SIDE OF THE SEAM

SCALE 1:1

MAT. MS-SHEET

BACK PART OF STORE BOX

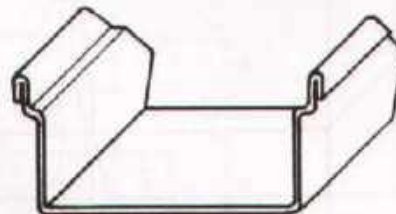
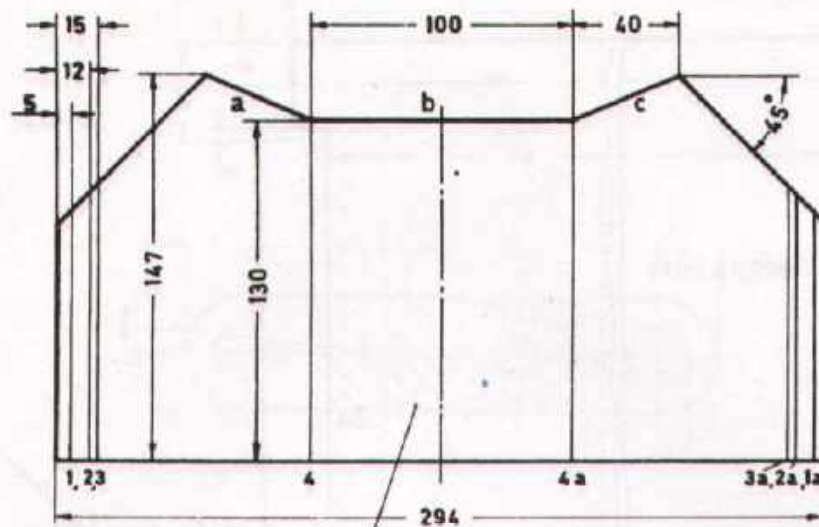
No. 2.3.5 / 1.1

FITTING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Tolerance $\pm 0,5$ 

SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS FLAT CHISEL SHEARING MACHINE	MARK THE SHEET (LINES 1 AND 3 ON THE BACKSIDE). CUT TO DIMENSION 294 X 147 AND ANGLES 45° ON THE SHEARING MACHINE. CUT AT THE LINES a, b, c WITH THE HELP OF A CHI- SEL, FOLD THE SHEET AT LINES 1.
2		BENDING MACHINE BENDING DIE TRY SQUARE	BEND AT LINES 2 AND 3 AS SHOWN IN THE SKETCH. USE A BENDING DIE.
3		BENDING MACHINE TRY SQUARE	BEND AT LINES 4.

SCALE 1:25

MAT. MS-SHEET

MAIN BODY OF STORE BOX

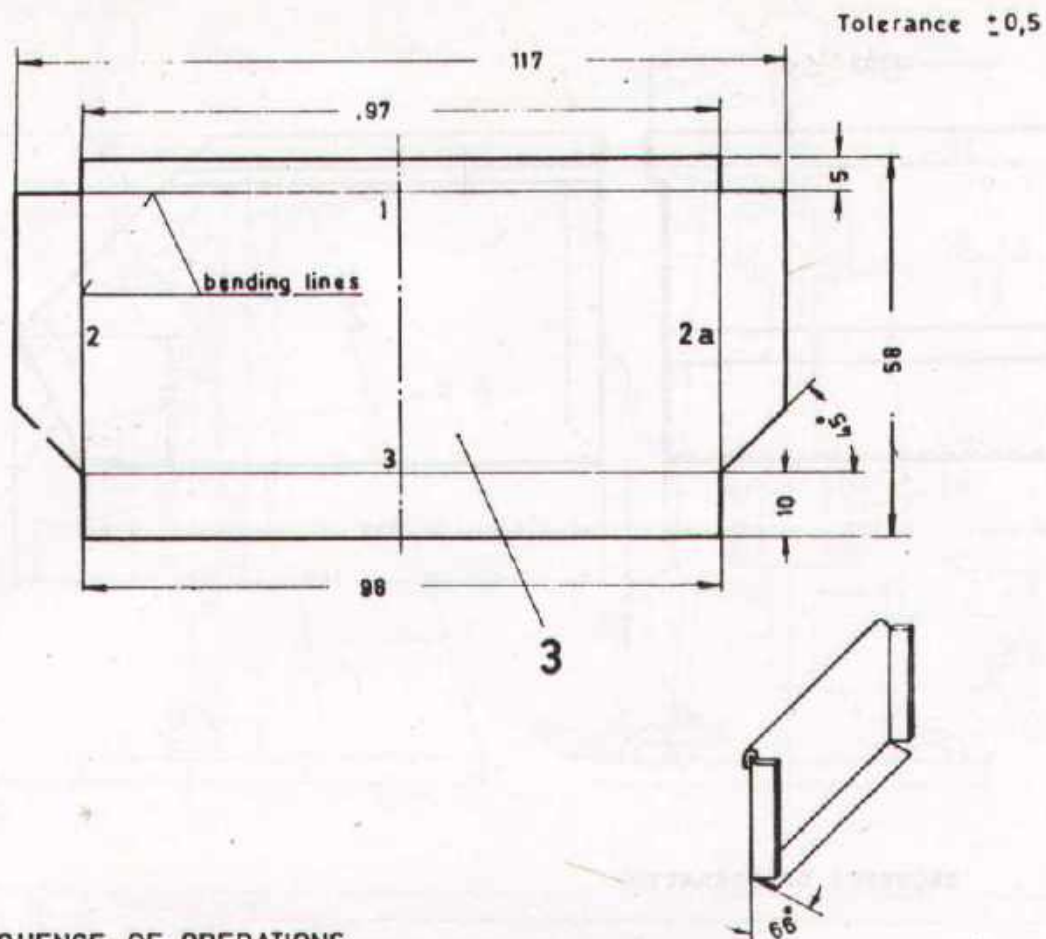
No. 2.3.5 /12

FITTING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS SHEARING MACHINE HAND SHEARS	MARK THE SHEET (LINE "1" AT THE BACKSIDE) CUT THE OUTER LINES ON THE SHEARING MACHINE & THE CORNERS WITH THE HELP OF HAND SHEARS.
2		BENDING MACHINE	FOLD THE SHEET AT LINE "1"
3		BENDING MACHINE ANGLE PROTRACTOR	BEND THE SHEET AT LINES 2 AND 2a BEND AT LINE 3 MIND THE ANGLE

SCALE 1:1

MAT. MS-SHEET

FRONT PART OF STORE BOX

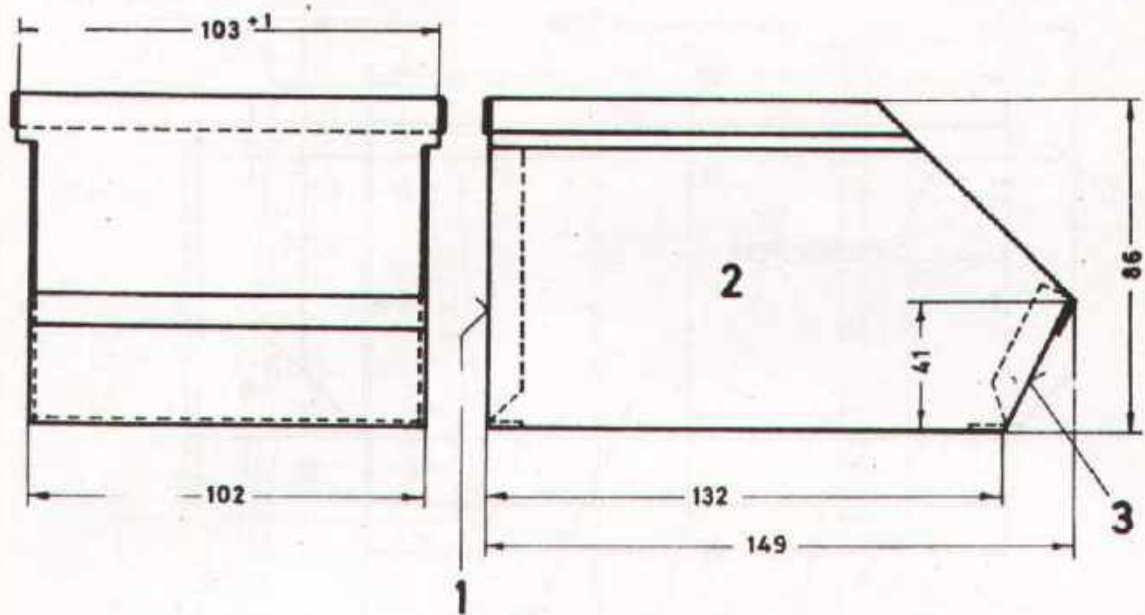
No. 2.3.5 / 1.3

FITTING II



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. REMOVE THE OXIDE LAYER FROM THE SPOTWELDING AREAS.
2. FIT PART NO. 1 AND 3 INTO PART NO. 2.
3. SPOTWELD THE BOX.
DISTANCE OF THE SPOTS 15 MM.
4. TACKWELD THE CORNERS AND FINISH BY FILING.

1	FRONT	2	MILD STEEL SHEET 22 SWG
1	MAIN BODY	2	MILD STEEL SHEET 22 SWG
1	BACK	1	MILD STEEL SHEET 22 SWG
QTY.	DENOMINATION	P No.	MATERIAL - REMARKS
MAT. MS-SHEET		STORE BOX	
		No. 2.3.5 /1-14	
			FITTING II
			
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING			
PAK-GERMAN TECHNICAL TRAINING PROGRAMME			

Blow lamp

The blow lamp is primarily used for larger workpieces such as large cable lugs for tinning and soldering.

Combustion bowl

Valve regulator

Filler cap

Air pump

Handle

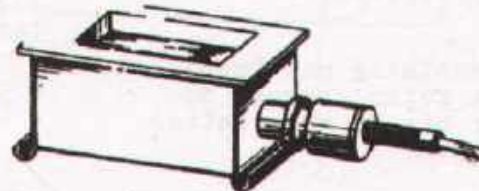
Preheating bowl

Fuel tank



Tinning bath

The tinning bath is used for mass production purposes. It can be heated either with open flame or electrically.



Solder iron

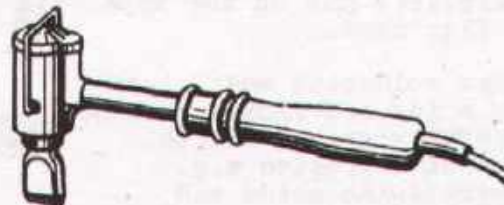
Electrically heated and used for soldering of small wires in radios or printed circuits, 16 upto 30 Watt



60 upto 150 Watt



200 upto 300 Watt



Note:

The solder iron must be clean and well tinned.

TRADE TRAINING I

SOLDERING APPLIANCES

MP/2.3/2.6.4/a

SOLDERING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Means for cleaning soldering irons (tinned end of copper bit)

Description and Use

Example

Linen rag
for wiping

Wire brush
for removing scale or oxide layers

Ammonium chloride block
for cleaning soldering iron chemically

File
for smoothing out burnt areas; major damages to copper bit to be repaired by forging



wire brush for cleaning



ammonium chloride

single cut file



Means for cleaning areas to be soldered or brazed. Initiation of the soldering or brazing process requires the area to be perfectly bright

triangular scraper

The area to be soldered or brazed may require cleaning both before-hand and afterwards:

- mechanical cleaning with tools
- chemical cleaning with acids or solvents

The choice of the cleaning means depends on the size, number and material of the workpieces and on the type of flux used.

After soldering most cleaning acids and fluxes must be carefully washed off to prevent corrosion e.g. neutralising acids and alkalis.



wire brush



blade scraper



file



TRADE TRAINING I

EQUIPMENT FOR CLEANING SOLDERING IRONS AND SOLDERING AREAS

MP/2.3/2.6.4/b

SOLDERING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Maintenance and Tinning of the Soldering Iron is necessary for guaranteeing a satisfactory transition of the heat stored by the iron to the workpiece. The iron must have a smooth and well tinned soldering surface. All impurities and defects are detrimental to and delay the transition of the heat. More frequent cleaning, re-finishing and retinning are therefore required.

Impurities

e.g., burnt flux, etc. must be:

1. wiped off with a linen cloth or
2. removed with a wire brush while the soldering iron is warm.

Damage to the copper section of the soldering iron is caused by the gradual dissolution of the copper by the solder (corrosion, scouring).

Minor Damage

- A. Refinish soldering surface of wedge and side faces.
- B. Heat and tin soldering iron.

Major Damage

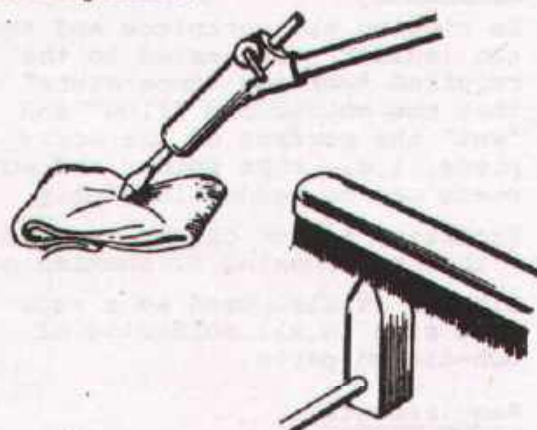
Re-forging copper section.
Further refinishing as under steps A and B.

Interchangeable copper sections must be descaled periodically.

The Tinning of the soldering surface can be effected, depending on the type and use of the iron, by one of the following techniques:

1. Rub soldering surface on ammonia stone with the addition of solder.
2. Apply flux on soldering surface (no soldering solution or acid) and add and distribute solder.
3. Apply soldering paste with sticks and distribute.
4. Spread tubular solder on soldering surface.

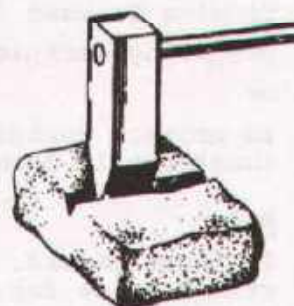
Care must be taken, that the soldering iron has the proper temperature.



Reforging



Core solder



Sol ammonia block

TRADE TRAINING I

MAINTENANCE OF SOLDERING IRONS

MP/2.3/2.6.4/c

SOLDERING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

What is Tinning?

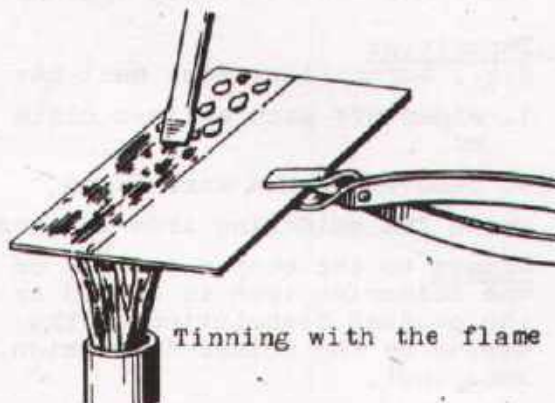
Tinning is a process for coating the surface of a workpiece with an insoluble layer of tin (solder).

Technique

In tinning the workpiece and the tin (solder) are heated to the required "working temperature" so that the solder can "flow" and "wet" the surface of the workpiece, i.e., that solder and workpiece can be bonded insolubly.

Excessive solder can be removed either by brushing or shaking off.

Tinning is also used as a separate step in all soldering of non-tinned parts.

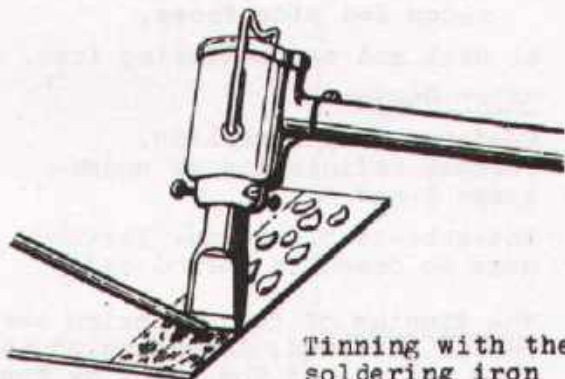


Tinning with the flame

Requirements

A proper tin coating can be obtained only if

1. the workpiece is free of all impurities and oxydations (combinations of metal with the oxygen of the air), i.e. it must be metalically pure;
2. no fresh oxydations can occur during tinning, these can generally be prevented by using Fluxes; and
3. workpiece and tin have been heated to the required working temperature.



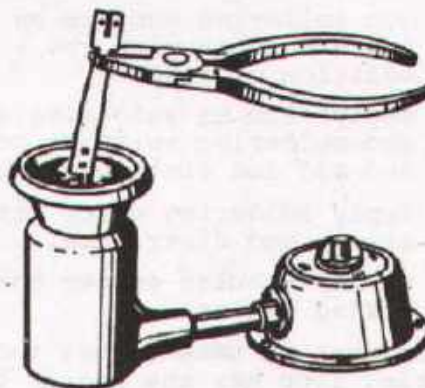
Tinning with the soldering iron

Purpose and Use

Tinning is used for preparing workpieces for soldering, or to protect workpieces (especially sheet metal) from corrosion.

Note

In these papers, tinning is described in as far as it is used manually as a preliminary to soldering.



Tinning by immersion

TRADE TRAINING I

INSTRUCTION SHEET

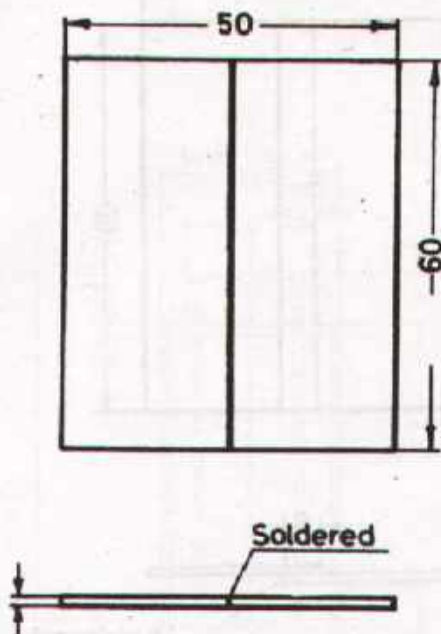
MP/2.3/2.6.4/d

SOLDERING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

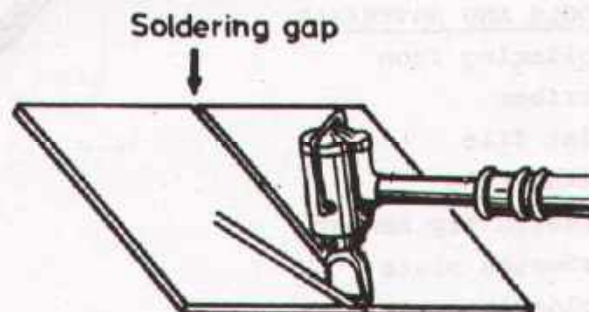


SEQUENCE / OPERATION

1. Take the material from Exercise Lap Joint and use the untinned side face for the butt joint.
2. Clean the sheet metal if necessary.
3. Leave a soldering gap of 0.2 mm between the sheet metal pieces.
4. Add flux and solder the butt joint.
5. Clean the butt joint.

TOOLS AND MATERIALS

Soldering iron
Asbestos plate or brick
Soldering paste
Tubular solder
Wire brush
Emery paper



TRADE TRAINING I

BUTT JOINT

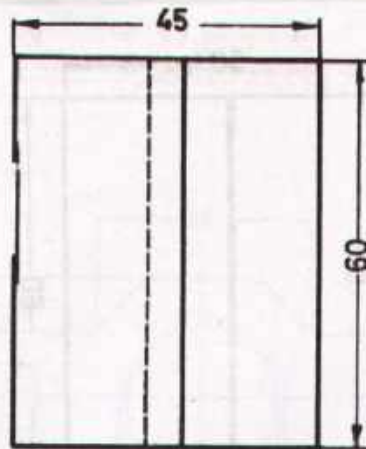
MP/2.3/2.6.4/2

SOLDERING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Deburr, straighten and clean the sheet metal plates.
2. Mark the plates.
3. Add flux and arrange the plates according to the drawing.
4. Solder the lap joint.
5. Clean the soldered joint.

TOOLS AND MATERIALS

Soldering iron

Scriber

Flat file

Meter rule

Plastic tip hammer

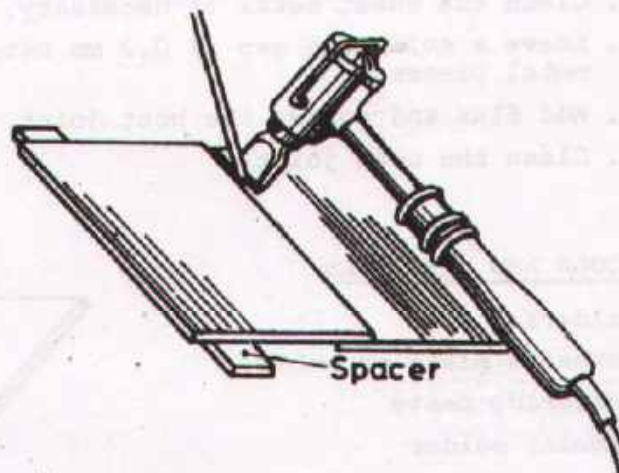
Asbestos plate

Soldering paste

Tubular solder

Wire brush

Emery paper



TRADE TRAINING I

LAP JOINT

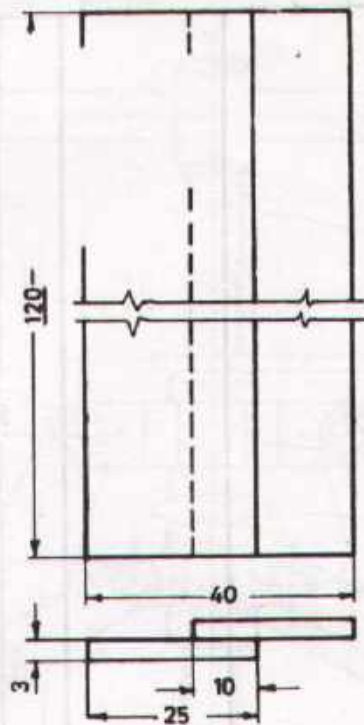
MP/2.3/2.6.4/1

SOLDERING



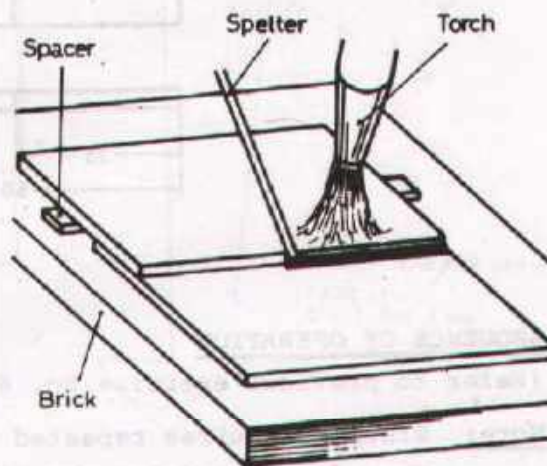
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. Cut, straighten and de-burr the material.
2. Clean the parts thoroughly.
3. Add flux and arrange according to sketch.
4. Heat up to working temperature.
5. Add spelter.
6. Clean the workpiece (no flux should remain on it).



DIRECTIONS

1. The area which is to be brazed must be clean (no oxide layer).
2. After cleaning don't touch the area with your hands.
3. Don't overheat the workpiece and the flux, use a "soft" flame (slight excess of acetylene).

SCALE 1:1

MAT. MILD STEEL

LAP JOINT

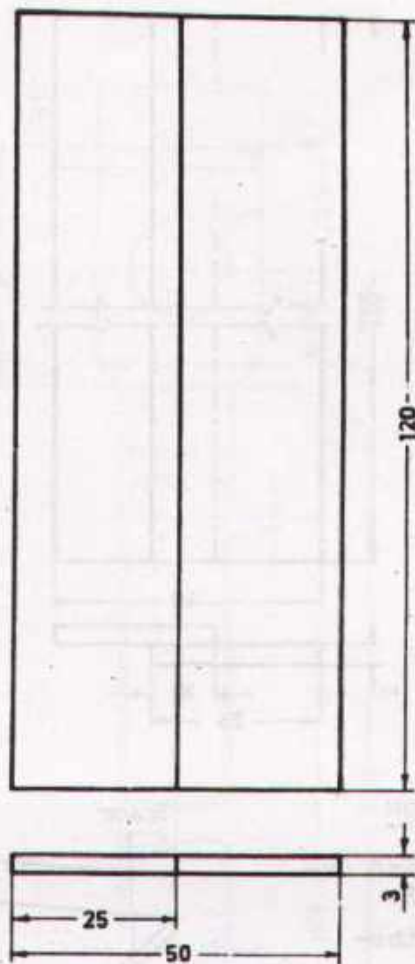
MP/2.3/2.6.4/6

BRAZING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

(Refer to previous exercise No. 6)

Note: Brazing requires repeated exercise.

Therefore the joint should be cut and re-brazed again until proper joints are achieved.

The workpiece sizes are only suggested, any suitable scrap material can be used.

SCALE 1:1

MAT. MILD STEEL

BUTT JOINT

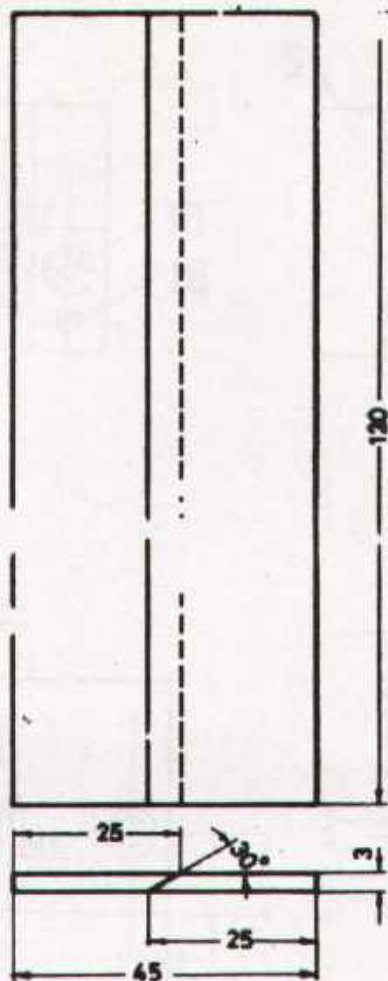
MP/2.3/2.6.4/7

BRAZING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATION

1. File the bevelled edge on both parts.
2. Join two parts by brazing as explained in exercise No. 6.

SCALE 1:1

MAT. MILD STEEL

BUTT JOINT AT AN ANGLE

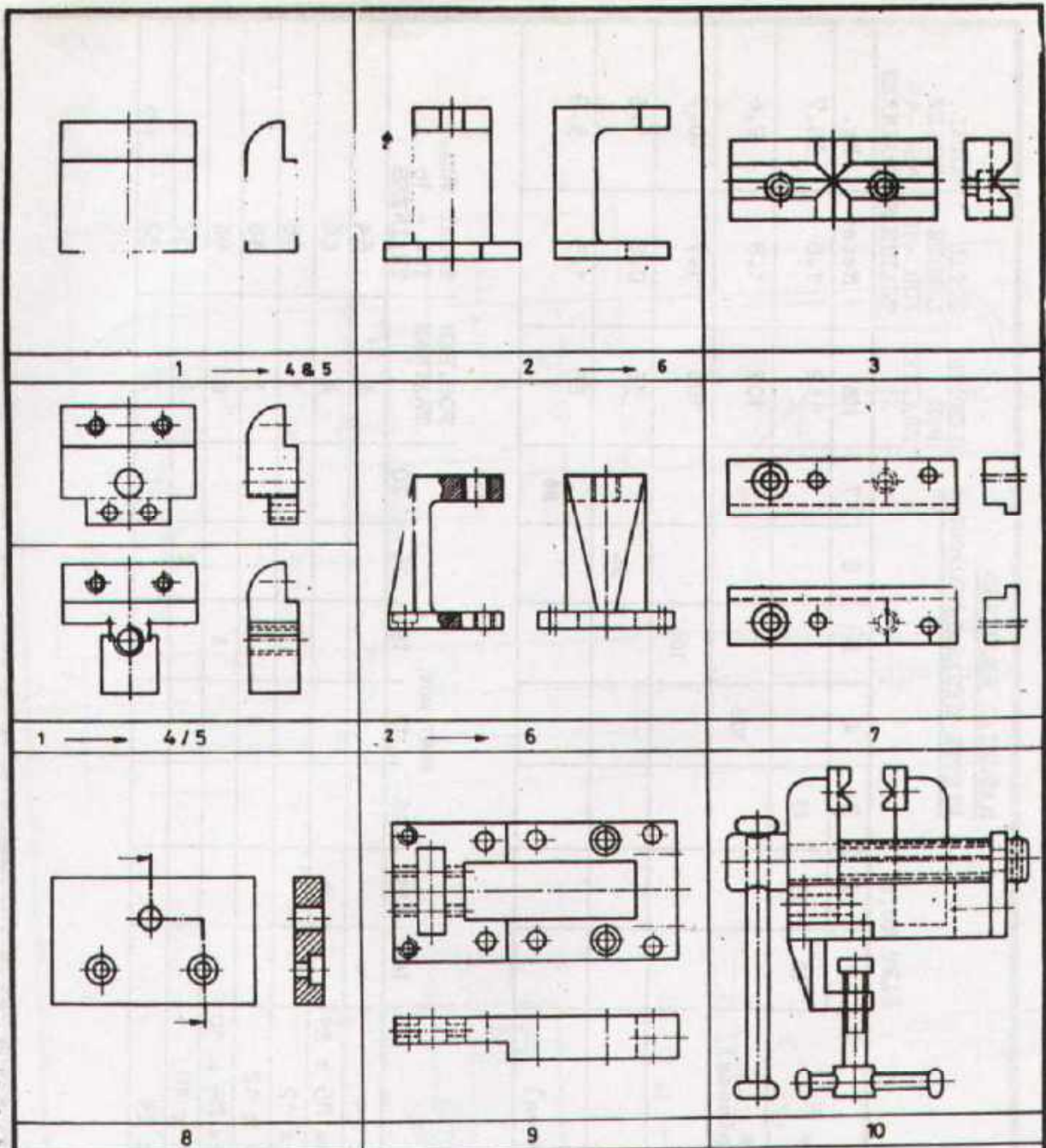
MP/2.3/2.6.4/8

BRAZING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



This vice should be completed within 6-8 weeks. Except for some turning operations, most of the parts can be produced by hand. Emphasis is laid on high accuracy, in particular for the fits.

TRADE TRAINING II

LAYOUT

(FOR VICE)

MP/2.1/3.13.1

WORKSHOP PROJECT



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAX-GERMAN TECHNICAL TRAINING PROGRAMME

**TRADE TRAINING
WORKSHOP PROJECT**

**MATERIAL REQUIRED
FITTER GENERAL/MILLWRIGHT**

No.3,13.1/ VICE	PART NO.8							MM	Meter	Kg.
	1	2	3	4	5	6	7			
M.S.Square 50 x 50 mm (2" x 2")	62	25	25					112	1.8	36.7
Tool Steel 18 x 10 mm (3/4" x 3/8") (for 2 pieces)				108				108	1.8	2.6
M.S.Flat 50 x 16 mm (2" x 5/8")					106			106	1.7	10.7
M.S.Flat 50 x 6 mm (2" x 1/4")						36		36	0.6	1.5
M.S.Flat 38 x 13 mm (1 1/4" x 1/2") (for 2 pieces)							88	88	1.5	5.9

	PART Nos.								NOS. PER TRAINEE	TOTAL NOS. FOR - 16 TRAINEES
	14	15	16	17	18	19	20			
Cylindrical pin 5 ⁶ x 24	4							4	64	
Socket head cap screw M5 x 24		4						4	64	
Cylindrical pin 2 ⁶ x 12			1					1	16	
Countersunk screw M5 x 12				3				3	48	
Socket head cap screw M4 x 10					6			6	96	
Countersunk screw M3 x 10						2		2	32	
Cylindrical pin 4 ⁶ x 24							2	2	32	



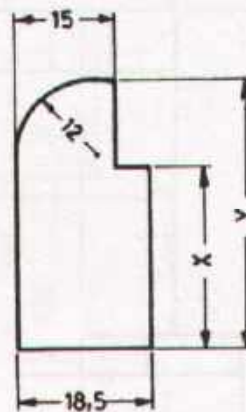
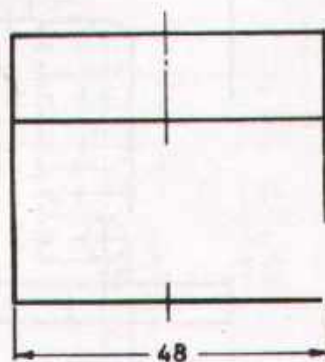
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

2 & 3



	X	Y
Piece I	28	42
Piece II	32	46

SCALE 1:1

MAT.: MILD STEEL

FIXED JAW & MOVABLE JAW

(FOR VICE)

MP/2.3/3.13.1/1

WORKSHOP PROJECT



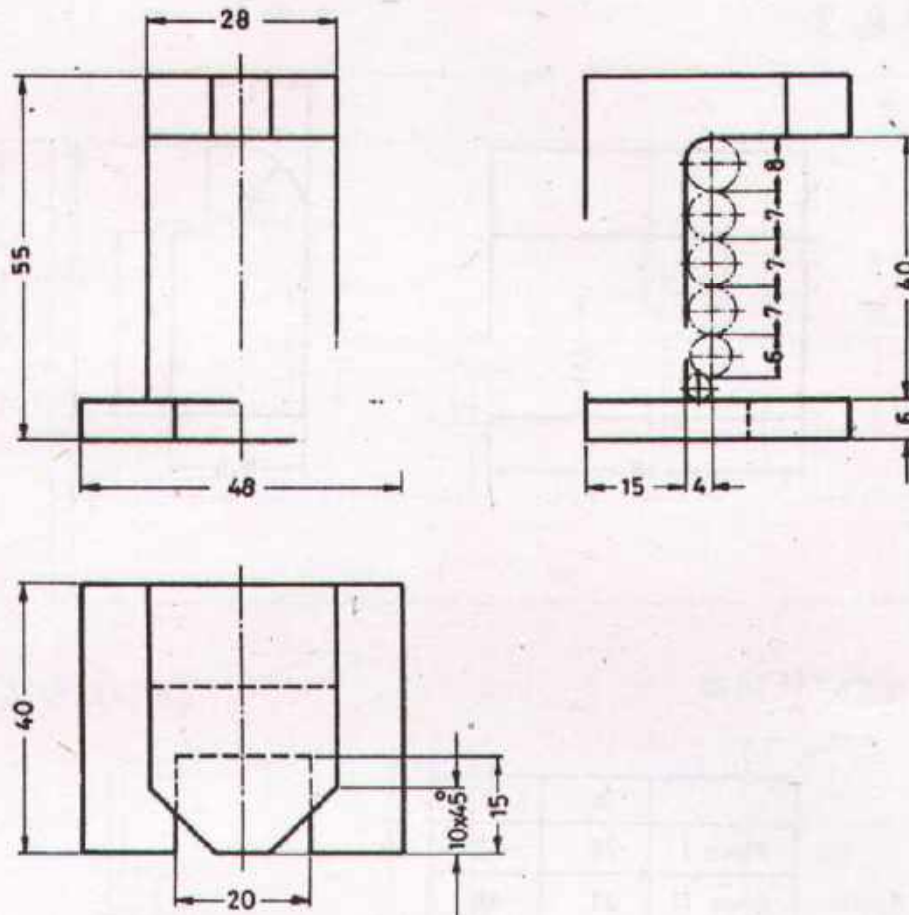
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

FAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

1



SCALE 1:1

MAT.: MILD STEEL

BOW

(FOR VICE)

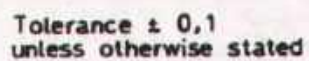
MP/2.3/3.13.1/2

WORKSHOP PROJECT

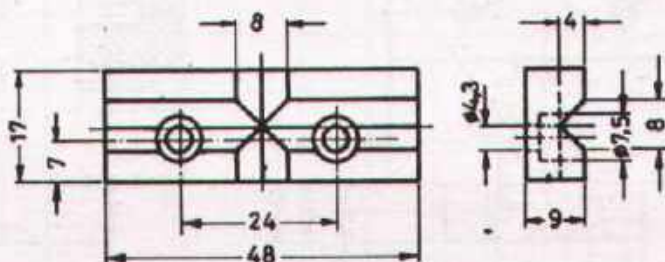


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



4



2 Pieces
Hardened to 48 HRC.

WORKSHOP PROJECT



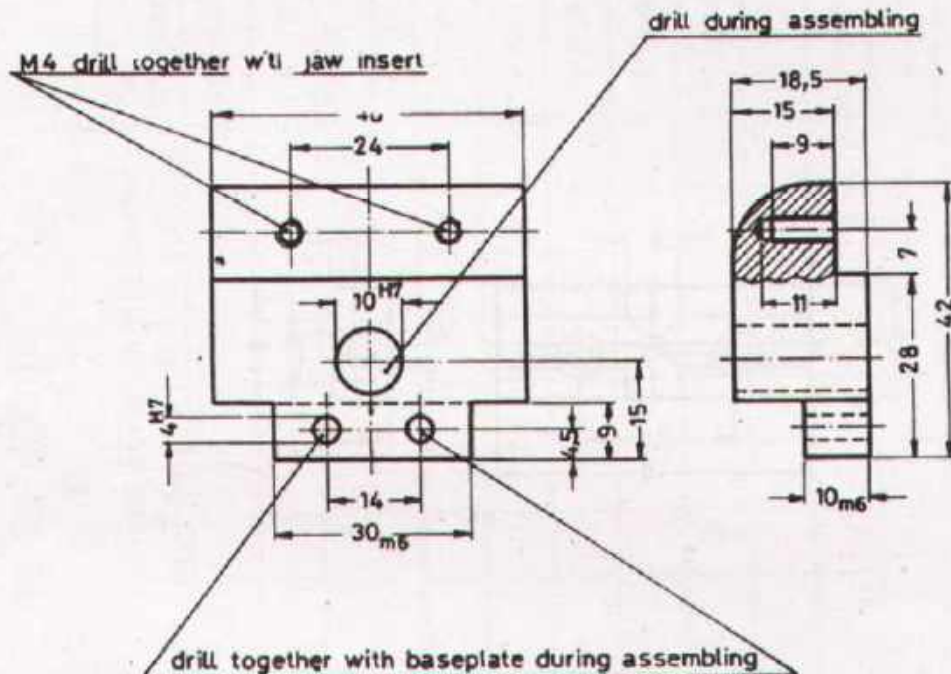
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

2



30 m6	+ 0,021 + 0,008
10 m6	+ 0,015 + 0,006
10 H7	+ 0,015 0
4 H7	+ 0,012 0

SCALE 1:1

FIXED JAW

From exercise No. 1

(FOR VICE)

MP/2.3/3.13.1/4

WORKSHOP PROJECT



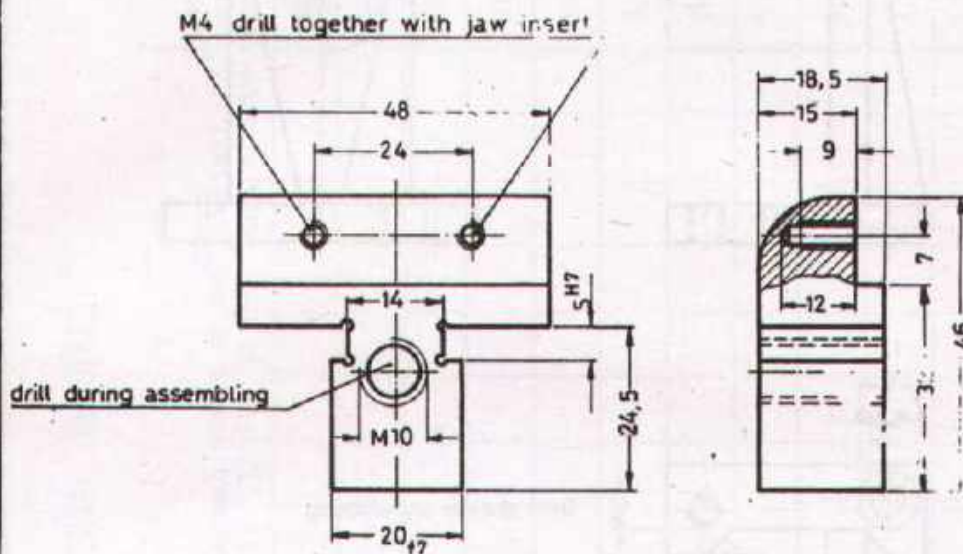
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

3



20 _{f7}	- 0,020 - 0,041
5 H7	+ 0,012 0

SCALE 1:1

MOVABLE JAW

From exercise No.1

(FOR VICE)

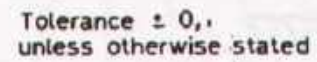
MP/2-3/3.13.1/5

WORKSHOP PROJECT

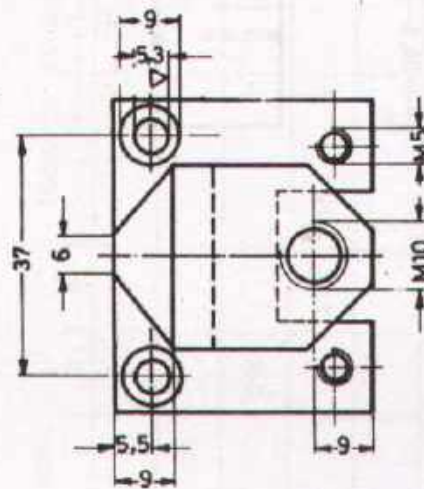
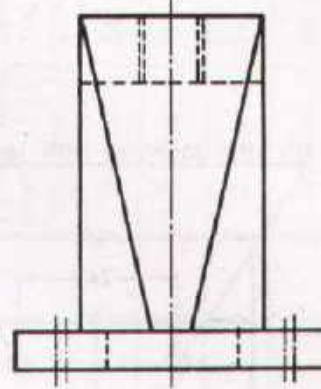
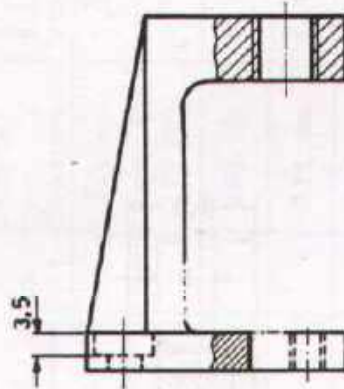


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



1



SCALE 1:1

BOW

From exercise No. 2

(FOR VICE)

MP/2.3/3.13.1/6

WORKSHOP PROJECT

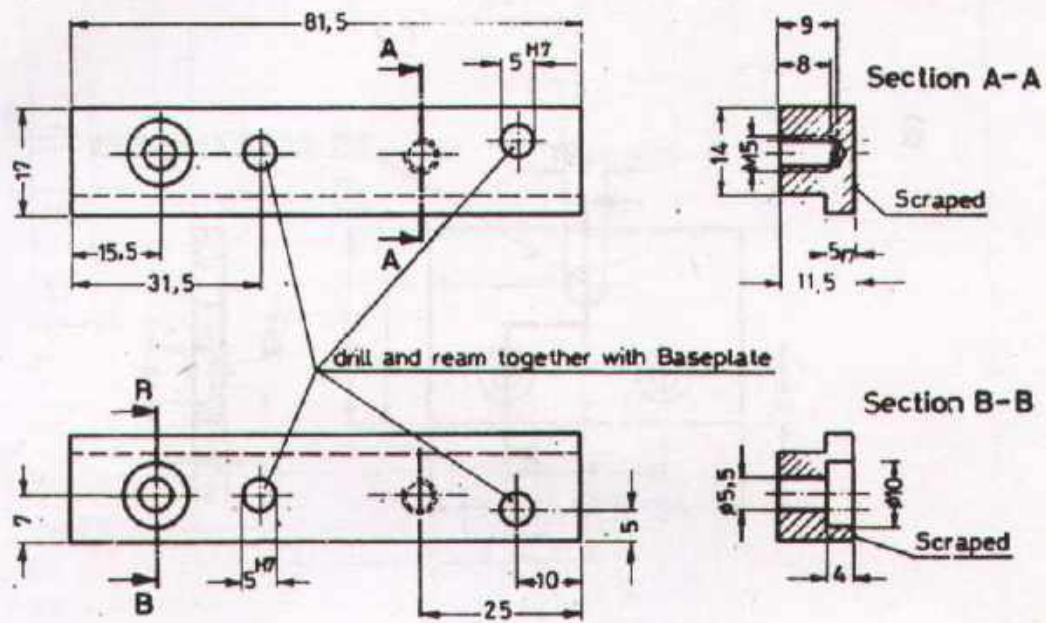


PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance $\pm 0,1$
unless otherwise stated

7



5 H7	+ 0,012 0
5 f7	- 0,010 - 0,022

SCALE 1:1

MAT.: MILD STEEL

GUIDE RAIL

(FOR VICE)

MP/2.3/3-13.1/7

WORKSHOP PROJECT



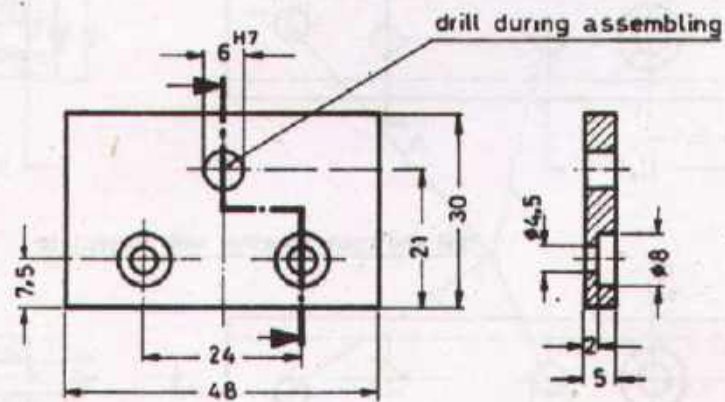
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

6



6 H7	$\begin{matrix} +0.012 \\ 0 \end{matrix}$
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SCALE 1:1

MAT.: MILD STEEL

SPINDLE GUIDE

(FOR VICE)

MP/2.3/3.13.1/8

WORKSHOP PROJECT



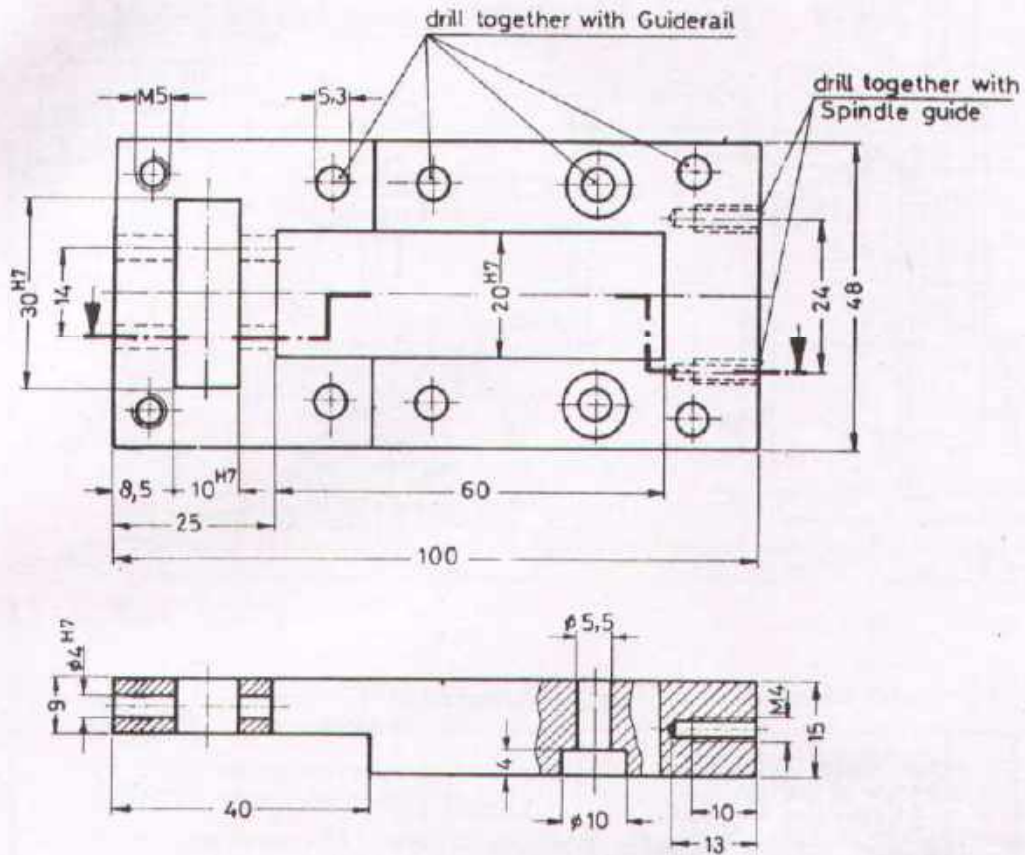
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance ± 0.1
unless otherwise stated

5



4 H7	+ 0.012 0
10 H7	+ 0.015 0
20 H7	+ 0.021 0
30 H7	+ 0.021 0

SCALE 1:1

MAT.: MILD STEEL

BASE PLATE

(FOR VICE)

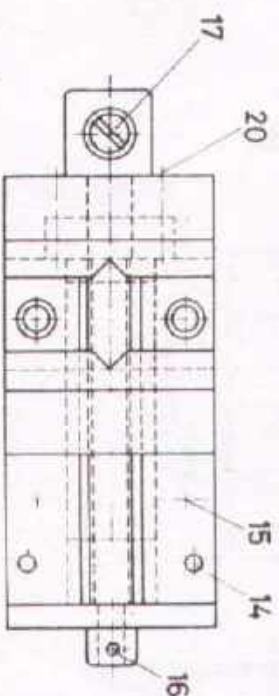
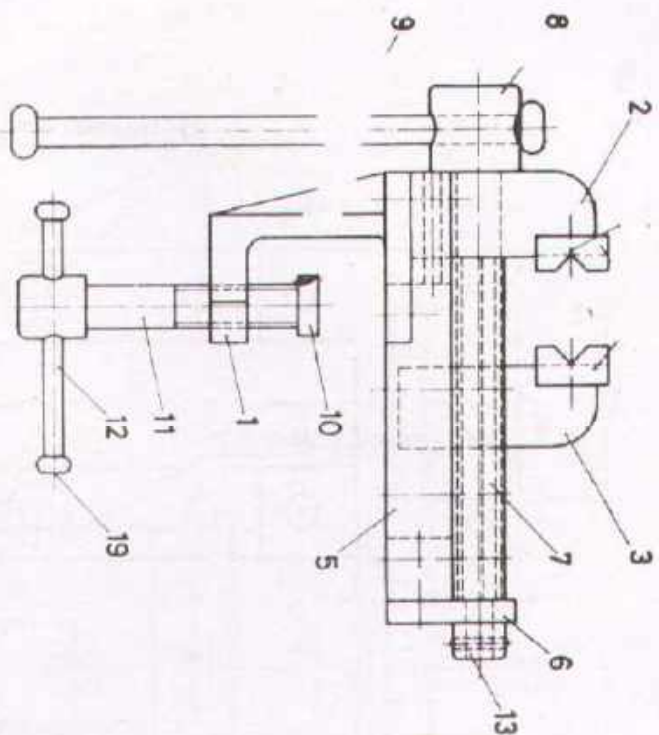
MP/2.3/3.13.1/9

WORKSHOP PROJECT



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



1	Cylindrical pin	20	6x 24
2	Countersink screw	19	M3 x 10
3	Socket head cap screw	18	M4 x 10
4	Countersink screw	17	M5 x 12
5	Cylindrical pin	16	2x 12
6	Socket head cap screw	15	M5 x 24
7	Cylindrical pin	14	5x 24
8	Bush	13	Mild steel 413 x 10 (from ex. 1.13.4/8)
9	Locking handle	12	Mild steel 415 x 35 (from ex. 1.13.4/11)
10	Locking spindle	11	Mild steel 415 x 65 (from ex. 1.13.4/7)
11	Pressure disc	10	Mild steel 415 x 6 (from ex. 1.13.4/7)
12	Locking handle	9	Mild steel 415 x 112 (from ex. 1.13.4/11)
13	Main spindle	8	Mild steel 410 x 135 (from ex. 1.13.4/8)
14	Guide rail	7	Mild steel 10 x 13 x 83
15	Spindle guide	6	Mild steel 50 x 6 x 32
16	Base plate	5	Mild steel 50 x 16 x 102
17	Jaw insert	4	Tool steel 18 x 50 x 10
18	Movable jaw	3	Mild steel 50 x 47 x 20
19	Fixed jaw	2	Mild steel 50 x 43 x 20
20	Bow	1	Mild steel 50 x 50 x 57

Qty.	Designation	Part No.	Material / Remarks
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VICE

MP/2 3/2 13.1/10
WORKSHOP PROJECT

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

MAX. QUALITY TECHNICAL TRAINING PROGRAMME



