



ENGINE FACTORY, AVADI

PROCESS SCHEDULE

DESCRIPTION :- **ARTICULATED CONNECTING ROD CAP.**

COMPT. No :- **20.04.22 - 4.**

MFG. SHOP :- **SPS.**

REV. No.: 00

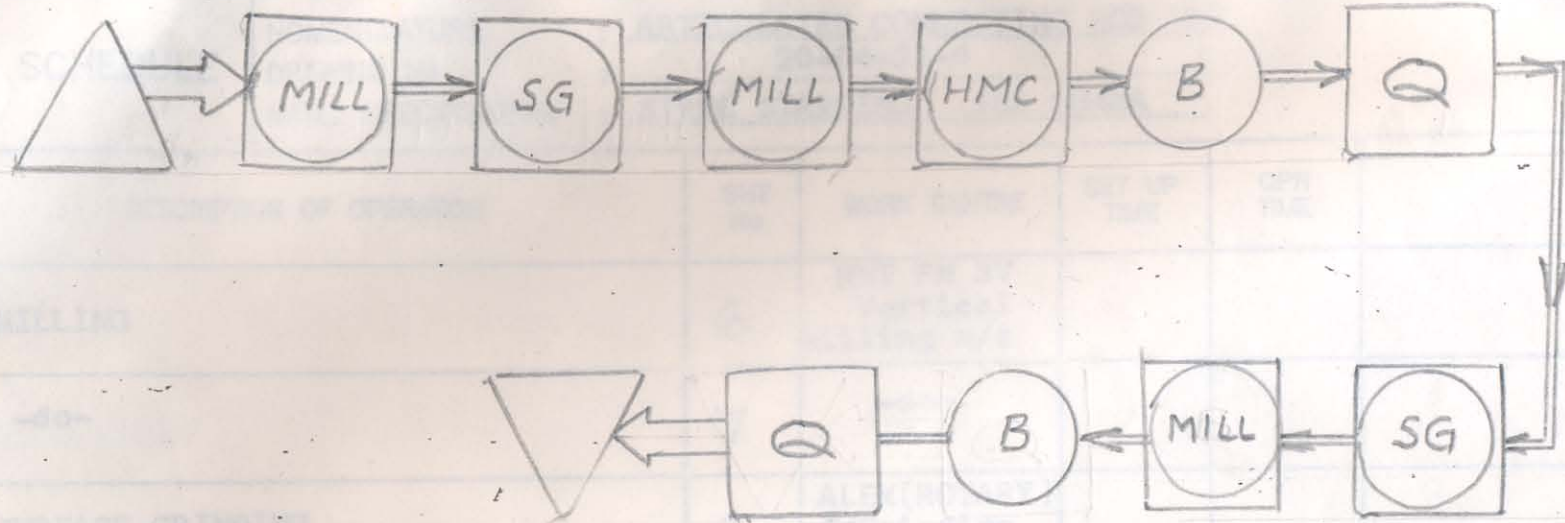
DATE - 22.10.96

FLOW PROCESS CHART

STORE :

DRG. NO.: 20-04-22-4

END STORE:



B Bench	C Collection of items	HT Heat treatment	LP Lead plating
ASSY. ASSEMBLY	CG CYLINDRICAL GRINDING	GD GUN DRILLING	MILL MILLING
BO BORING	D DRILLING	HMC HORIZONTAL MACHINING CENTRE OPERATION	POL POLISHING
CD CRACK DETECTION	DA DISASSEMBLY	HP HYDRAULIC PRESS	SG SURFACE GRINDING
CFG CREEP FEED GRINDING	FB FINE BORING	LAP LAPPING	TUR TURNING

LEGEND		APPROVAL		SECTION	IPS
TEMP. STORAGE	▽	TRANSPORTATION	➡	SIGNATURE & DATE	NO. OF SHEETS
OPERATION	○	INSPECTION BY QC	Q	PREPARED BY <i>QSh</i>	SHEET NO.
OPERATION CUM INSPECTION	◻	INSPECTION BY SQA/E/CQA(ME) Etc.	I	APPROVED BY <i>[Signature]</i>	ENGINE FACTORY, AVADI, MADRAS 600 020
100% INSPN. BY MEG SEC	◻	STORAGE	△	AUTHORISED FOR ISSUE <i>Make 22/10/96</i>	



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE	NOMENCLATURE : ARTICULATED CONNECTING ROD CAP
	DRAWING No : 20-04-22-4
	MATL. SPECIFICATION : ..STEEL..STAMPING.....18X..2H4MA.....

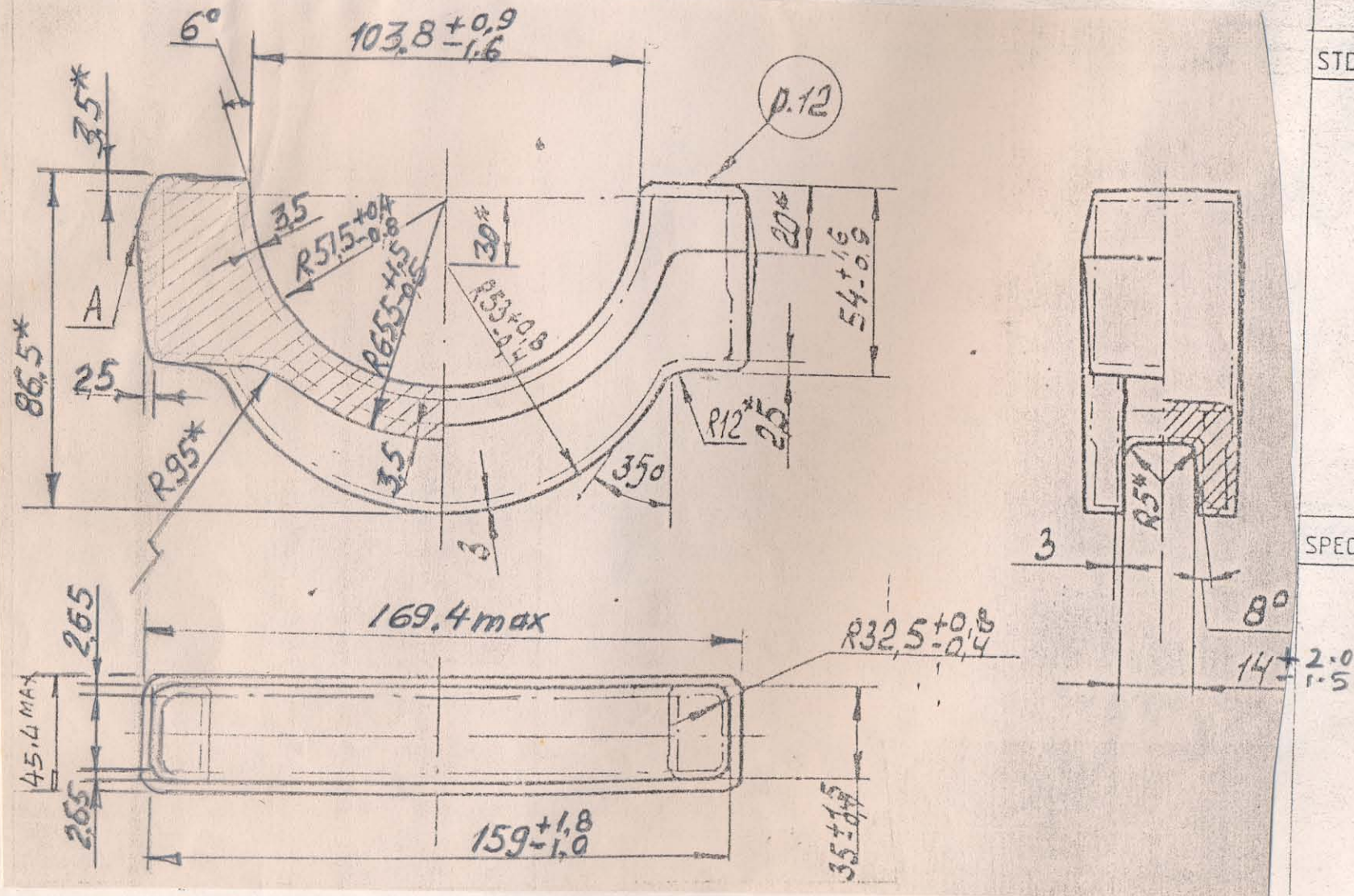
OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
090	MILLING	14 & 15	PRAGA HMC 4.00			
100	DEBURRING	16	BENCH			
110	INSPECTION	17	BENCH			
120	SURFACE GRINDING	18	ALEX(ROTARY) S/grinding m/c			
130	-do- USING A CRACK DETECTION	19	-do-			
140	-do- INSPECTION	20	PRAGA S/Grinding m/c			
150	-do-	21	-do-			
160	DEBURRING		BENCH			

PREPARED BY		CHECKED BY		APPROVED BY		AUTHORISED BY						
SIGN	<i>QS. V...</i>	SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	<i>[Signature]</i>						SHT. No
DATE	21/10/96	DATE	22.10.96	DATE	22.10.96							2 OF 24
C/MAN-II /PDO		cpmz /PDO		HOS/PDO		DO/PDO		PDO REF	ISSUE	DATE	SIGN	

MACHINE:

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES



STEEL - P&TE/EFA

DESIGN	APPD	P&TE-REF	ISSUE	DATE
<i>[Signature]</i>	<i>[Signature]</i>			
PREP	OID	APPD	P&TE-REF	ISSUE

MACHINE:

STD. TOOLS & GAUGES

TECHNICAL REQUIREMENTS

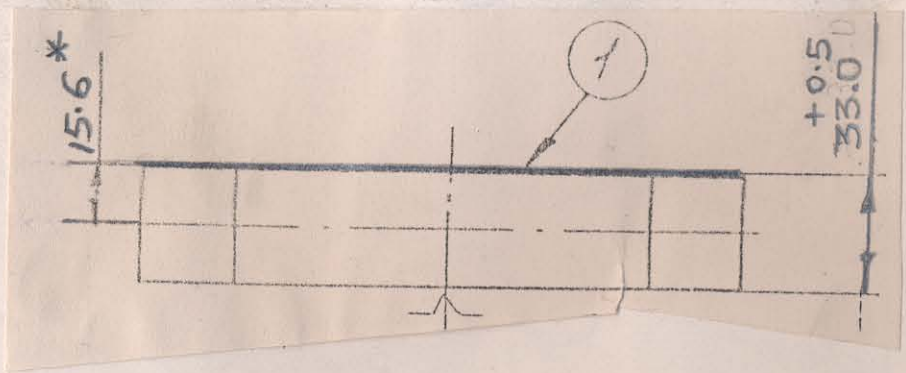
1. **Hardening**, tempering HB 302...341($d_{\text{casting}} = 3.5 \dots 3.3 \text{ mm}$).
2. * - Dimensions provided by tools.
3. **Non**-indicated drafts 5...7°.
4. **Non**-indicated radiuses of roundings R 3 mm.
5. **Non**-filling of angles within 0.5 of actual allowance.
6. Deviation from flatness is 0.8 mm max.
7. Displacement by the joint line of dies is 0.9 mm max.
8. Burr by shear perimeter is 1.2 mm max, tightening of burr A is 1.5 mm max.
9. Dents from scale, nicks and other similar defects are allowed at depth not more than 0.5 of the actual allowance.
10. **Scabs**, haircracks and other similar defects except cracks are allowed at length not more than 0.5 of the actual allowance with determination of the defect laying depth by local grooves across, selectively 0.5% from the set.
11. **Clean** from scale.
12. **Mark** the melting index.

SPECIAL TOOLS & GAUGES

08V	<i>[Signature]</i>				
PRED	CHD	APPD	P&TE-REF	ISSUE	DATE

RA5/

MACHINE: Vertical
Milling machine
HMT, FN-3V.



* DIMENSION FOR REFERENCE.

STD. TOOLS & GAUGES

1. Face milling cutter $\varnothing 80$
M40 SP 15
2. Insert:
SPKN 1504
TTR ~~508~~
3. Vernier caliper
150 mm

SPECIAL TOOLS & GAUGES

- | | |
|------------|--------|
| 1. Fixture | 201421 |
|------------|--------|

PREP	CID	APPD	P&TE-REF	ISSUE	DATE

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

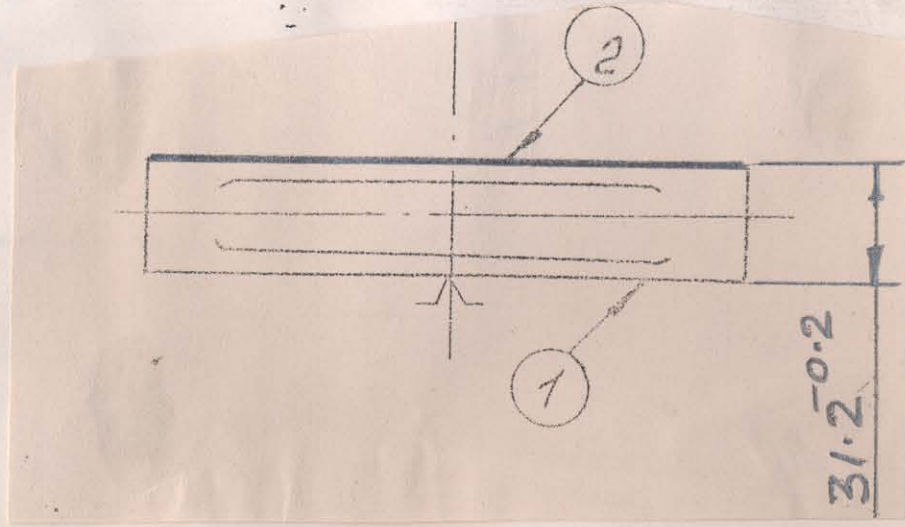
ARTICULATED CONNECTING ROD CAP

DRAWING No.
20-04-22 -4

ISSUE

OPN. No.
020

OPERATION
MILLING



Ra 5

MACHINE: Vertical
Milling machine
HMT, FN-3V.

STD. TOOLS&GAUGES

1. Face Milling cutter $\varnothing 80$
M40 SP15.
2. Insert:
SPKN 1504
TTR EDR
3. Vernier caliper
150 mm

TECHNICAL REQUIREMENTS

1. Non-parallelism of surfaces (1) & (2) should not exceed 0.20 mm.

SPECIAL TOOLS&GAUGES

1. Fixture 201421
2. Depth gauge 030/24
31.2 -0.2

PREP	APPD	P&TE-REF	ISSUE	DATE
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PLANNING SHEET - PDO/EFA

FORM No: EFA/P-039

NOMENCLATURE

ARTICULATED CONNECTING ROD CAP

DRAWING No.
20-04-22-4

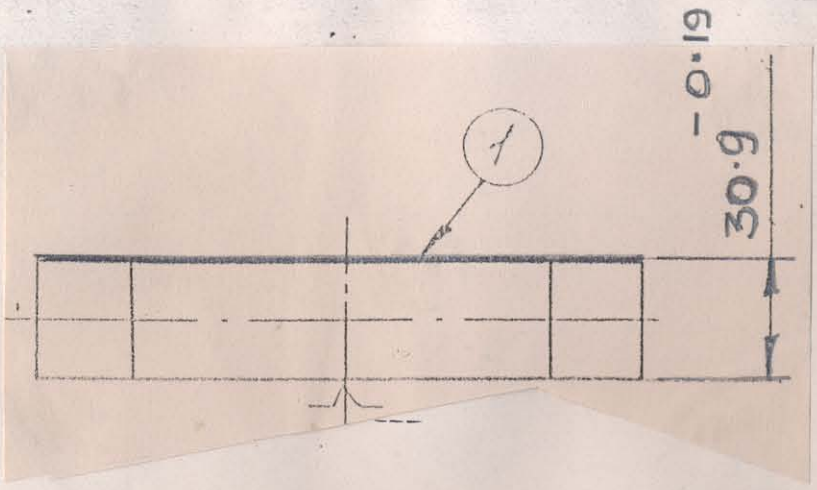
ISSUE

OPN. No.
030

OPERATION
GRINDING

Ra 2.5

MACHINE: Surface Grinding machine ALEX



STD. TOOLS & GAUGES

- Grinding wheel segments
size: 6"x4"x1.5"
Grade: AA36 J23
- Depth mic
25-50

SPECIAL TOOLS & GAUGES

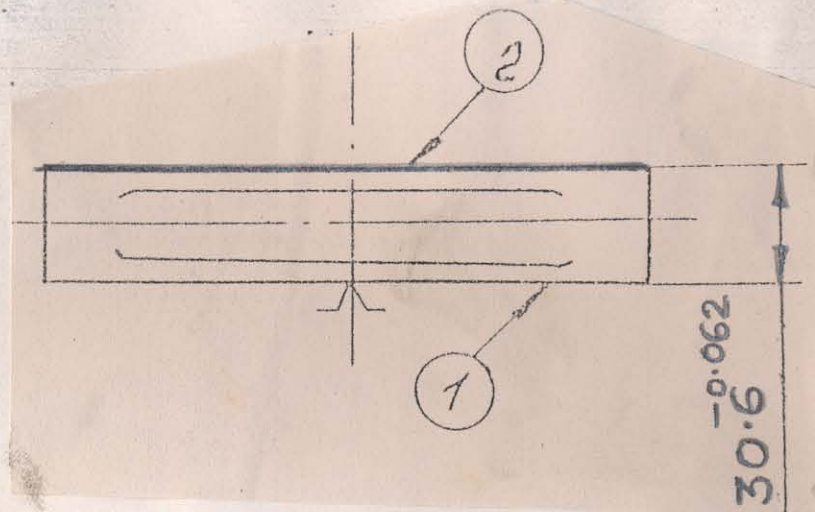
TECHNICAL REQUIREMENTS

1. Surface finish of surface (1) & (2) should not exceed 0.025 mm.

DESIGN	APPD	P&TE-REF	ISSUE	DATE
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MACHINE: Surface
Grinding machine
ALEX

Ra2.5/



STD. TOOLS&GAUGES

1. Grinding
wheel
segments

size: 6"x4"x1.5"

Grade: AA36 J23

2. Depth mic
25-50

SPECIAL TOOLS&GAUGES

1. Gap gauge 25/03/38
30.6 -0.062

TECHNICAL REQUIREMENTS

1. Non-parallelism of surfaces (1) & (2) should not exceed 0.03 mm.

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

ARTICULATED CONNECTING ROD CAP

DRAWING No.

20-04-22-4

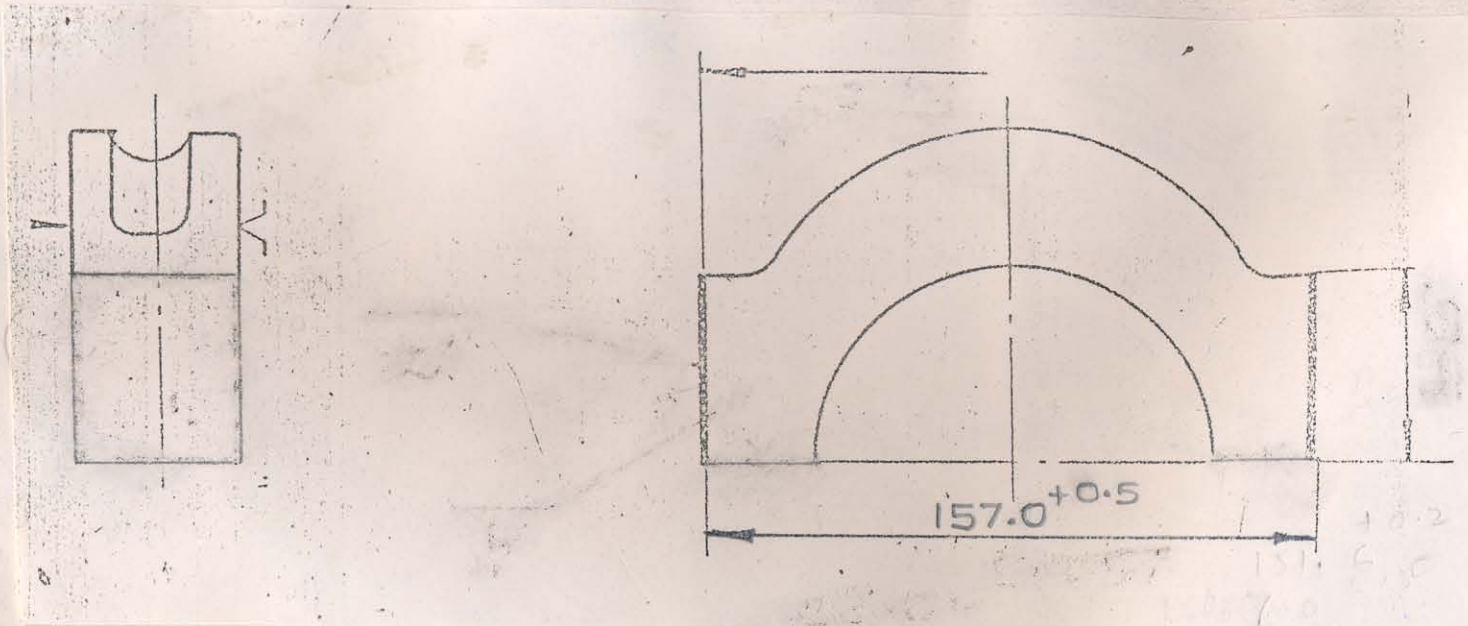
ISSUE

OPN. No. 050

OPERATION MILLING

MACHINE: Horizontal Milling machine HMT FN 3H

R05



STD. TOOLS&GAUGES

1. Face milling cutter $\phi 80$ M40 SP15
2. Insert: SPKN 1504 TTR EDR
3. Out side mic 150-175

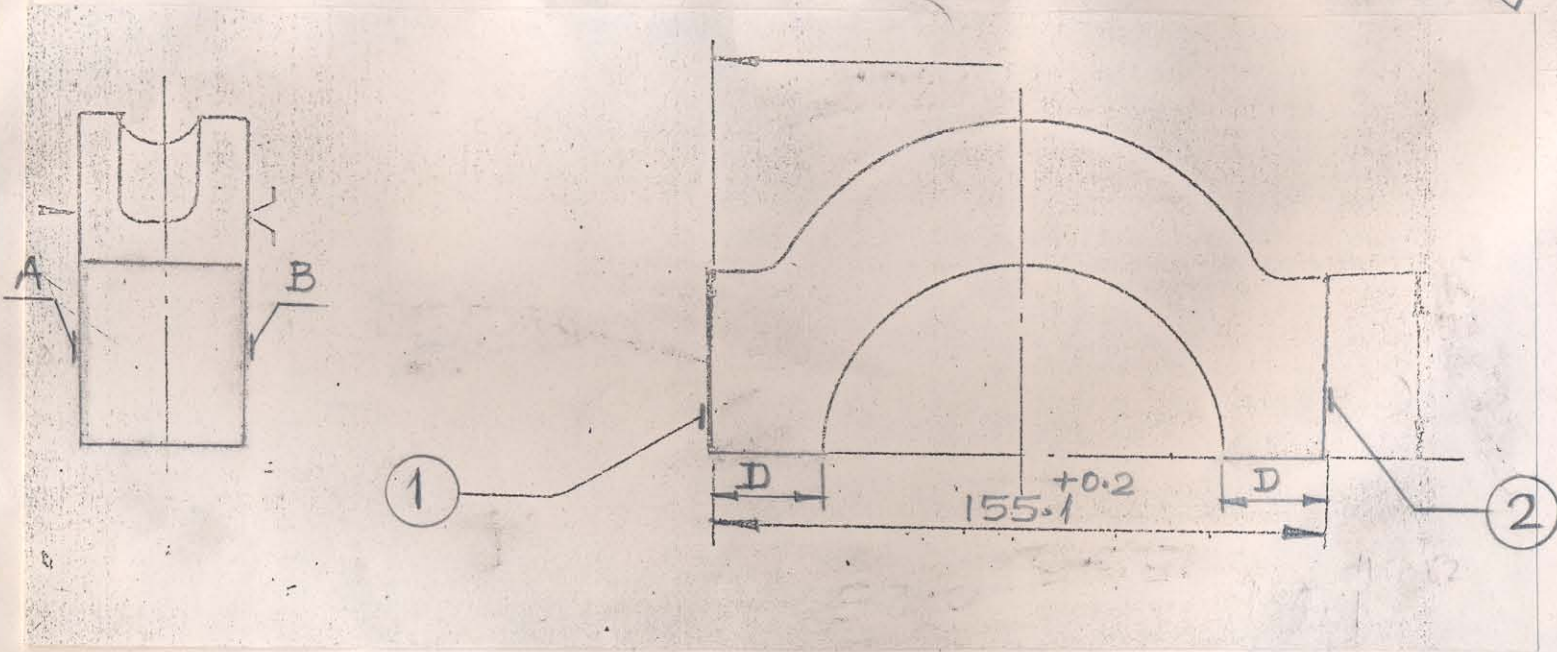
SPECIAL TOOLS&GAUGES

1. Fixture 201435

PREP	CHD	APPD	P&TE-REF	ISSUE	DATE

MACHINE: Horizontal Milling machine
HMT FN 3H

Ra 5



STD. TOOLS & GAUGES

1. Face milling cutter $\varnothing 80$
M40 SP 15
2. Insert:
SPKN 1504
TTR EDR
3. Out side mic
150-175

SPECIAL TOOLS & GAUGES

1. Fixture 201435
2. Gap gauge 026/03/30
154.5^{-0.25}

TECHNICAL REQUIREMENTS

1. Non-parallelism of surfaces ① & ② should not exceed 0.05 mm.
2. Non-squareness of surfaces ① & ② relative to the planes 'A' & 'B' should not exceed 0.10 mm.
3. * Dimension for reference.
4. Variation in dimension 'D' - 'D' should not exceed 0.2 mm

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PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

ARTICULATED CONNECTING ROD CAP

DRAWING No.

20-04-22-4

ISSUE

OPN. No.
070

OPERATION
MILLING

MACHINE: Vertical
Milling machine
HMT FN 3V

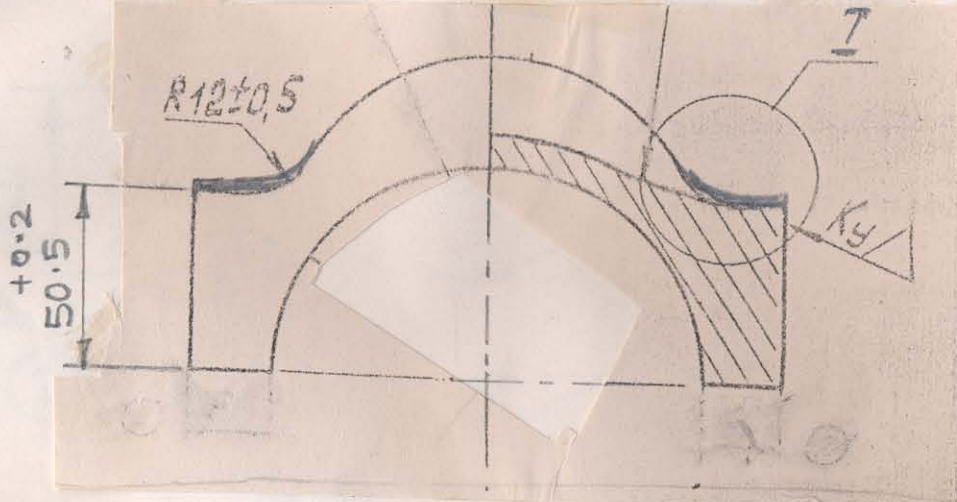
STD. TOOLS&GAUGES

1. Face milling cutter $\varnothing 80$
M40 SP 15
2. Insert:
SPKN 1504
TTR EDR
3. Bench vice
4. Depth mic
25-50

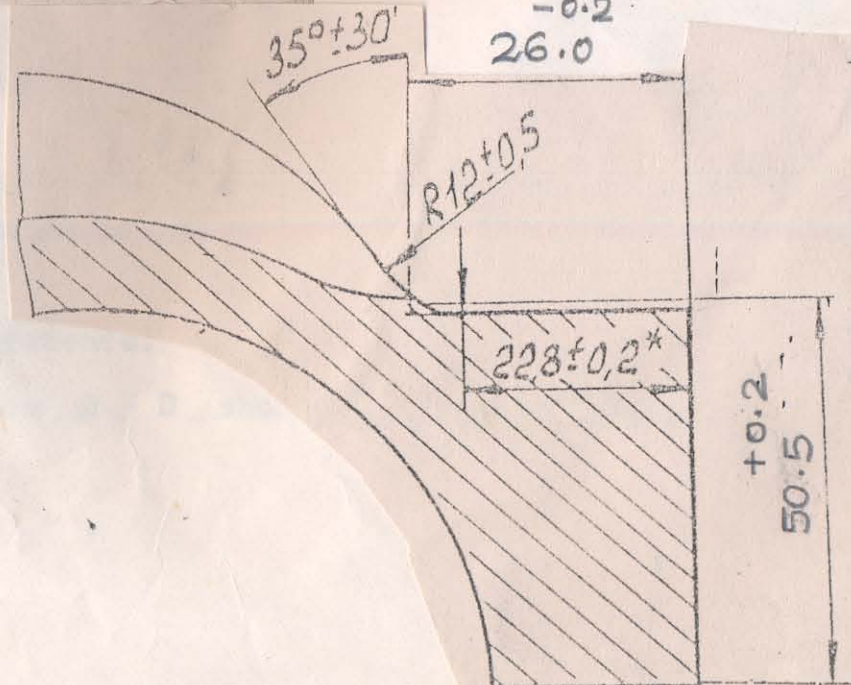
SPECIAL TOOLS&GAUGES

1. Fixture
- 2.

Ra 5



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Q&V	<i>[Signature]</i>				
PREP	CHK	APPD	P&TE- REF	ISSUE	DATE

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

ARTICULATED CONNECTING ROD CAP

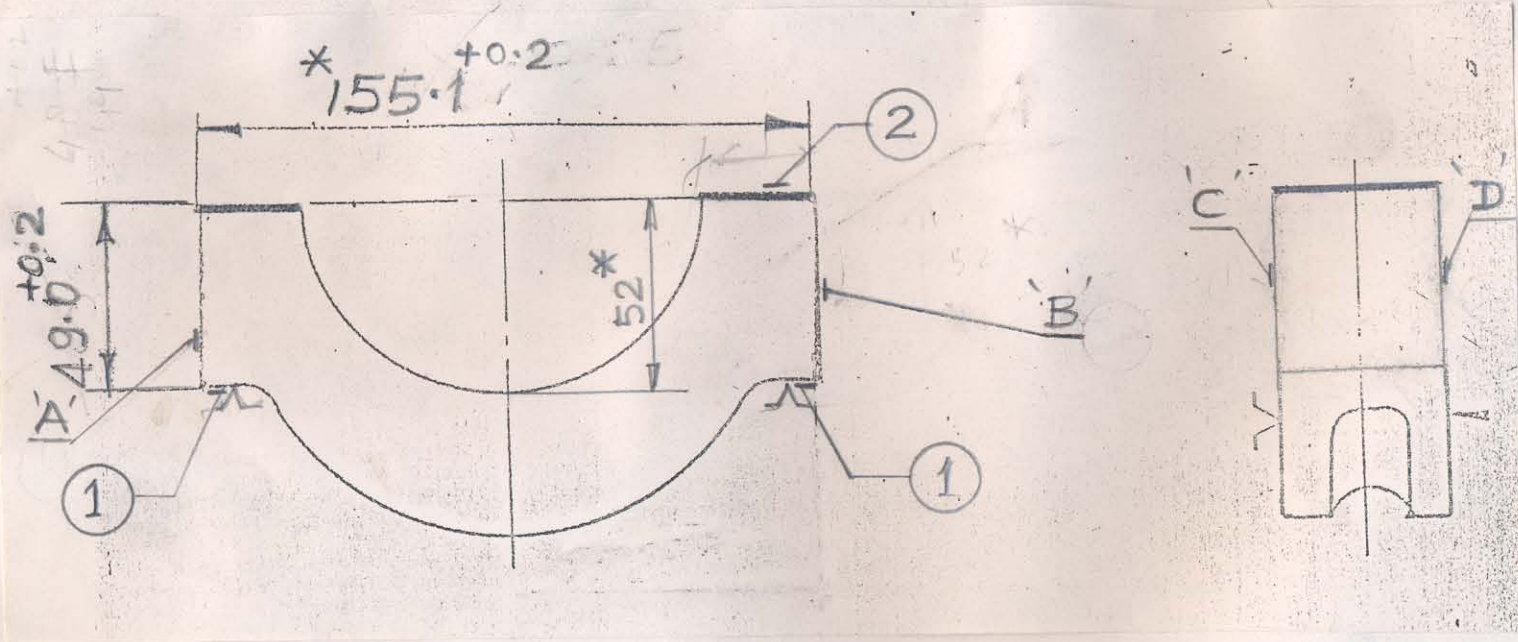
DRAWING No. 20-04-22-4

ISSUE

OPN. No. 080

OPERATION MILLING

MACHINE: Vertical milling machine
HMT FN 3V



STD. TOOLS&GAUGES

1. Face milling cutter $\varnothing 80$
M40 SP15
2. Insert:
SPKN 1504
TTR EDR
3. Depth mic
25-50

SPECIAL TOOLS&GAUGES

1. Fixture 201427

TECHNICAL REQUIREMENTS

1. Non-parallelism of surfaces ① & ② should not exceed 0.10 mm.
2. Non-squareness of surfaces ① & ② relative to the plane A, B, C & D should not exceed 0.20 mm.
3. * Dimensions for reference.
4. Variation in dimension D - D should not exceed 0.2 mm

PREP	CHK	APPD	P&TE-REF	ISSUE	DATE

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

ARTICULATED CONNECTING ROD CAP

DRAWING No. 20-04-22-4

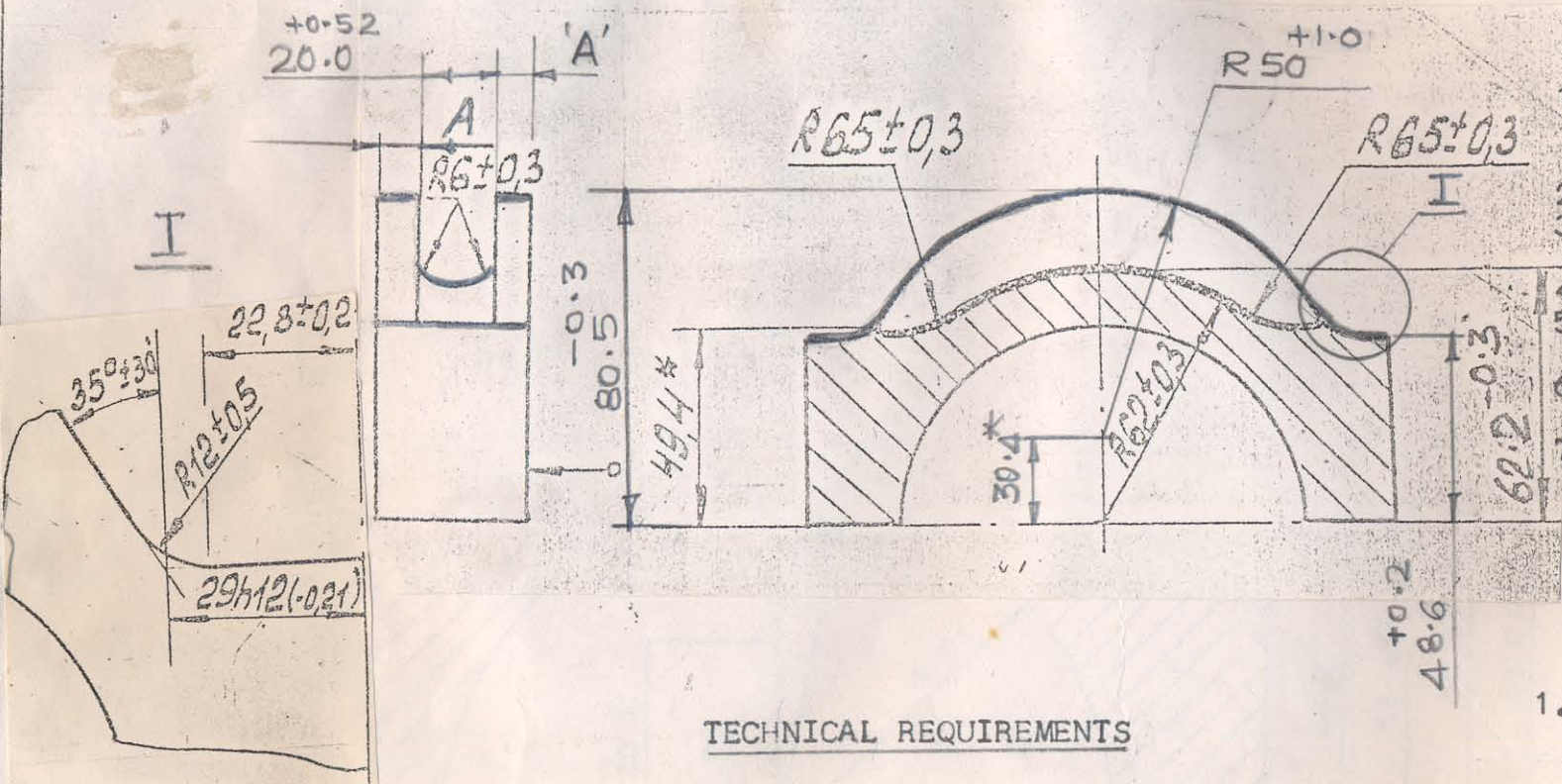
ISSUE

OPN. No. 090

OPERATION MILLING

Ra5

MACHINE: HMC 600



STD. TOOLS&GAUGES

1. Deep shoulder end milling cutter $\phi 40$ Widia No. 80396974
 2. Insert: SPMW 120408
 3. Slitting saw $\phi 100 \times \phi 32 \times 6W$
 4. sandvik 331.31.100060.235
 5. Insert No; 331.31.3512.31 SMA 30 grade
 6. S&F cutter $\phi 100$ M90 TP11
 7. Insert: TPAN 1102
- Profile gauge 203074
 Depth gauge 030/26
 Profile gauge 203069
 R62 x R65

SPECIAL TOOLS&GAUGES

1. Taper shank long series carbide tipped brazed end mill $\phi 24$ 47/2 08 046/00/025
2. S&F cutter $\phi 80 \times 20W \times 5 \times 45$ 42/8
3. S&F cutter $\phi 80 \times 20W \times ER6$ 42/8
4. Fixture 201249
5. Profile gauge 203033
6. -do- 203073
7. Depth gauge 48.4 30/25
8. Profile gauge 203031

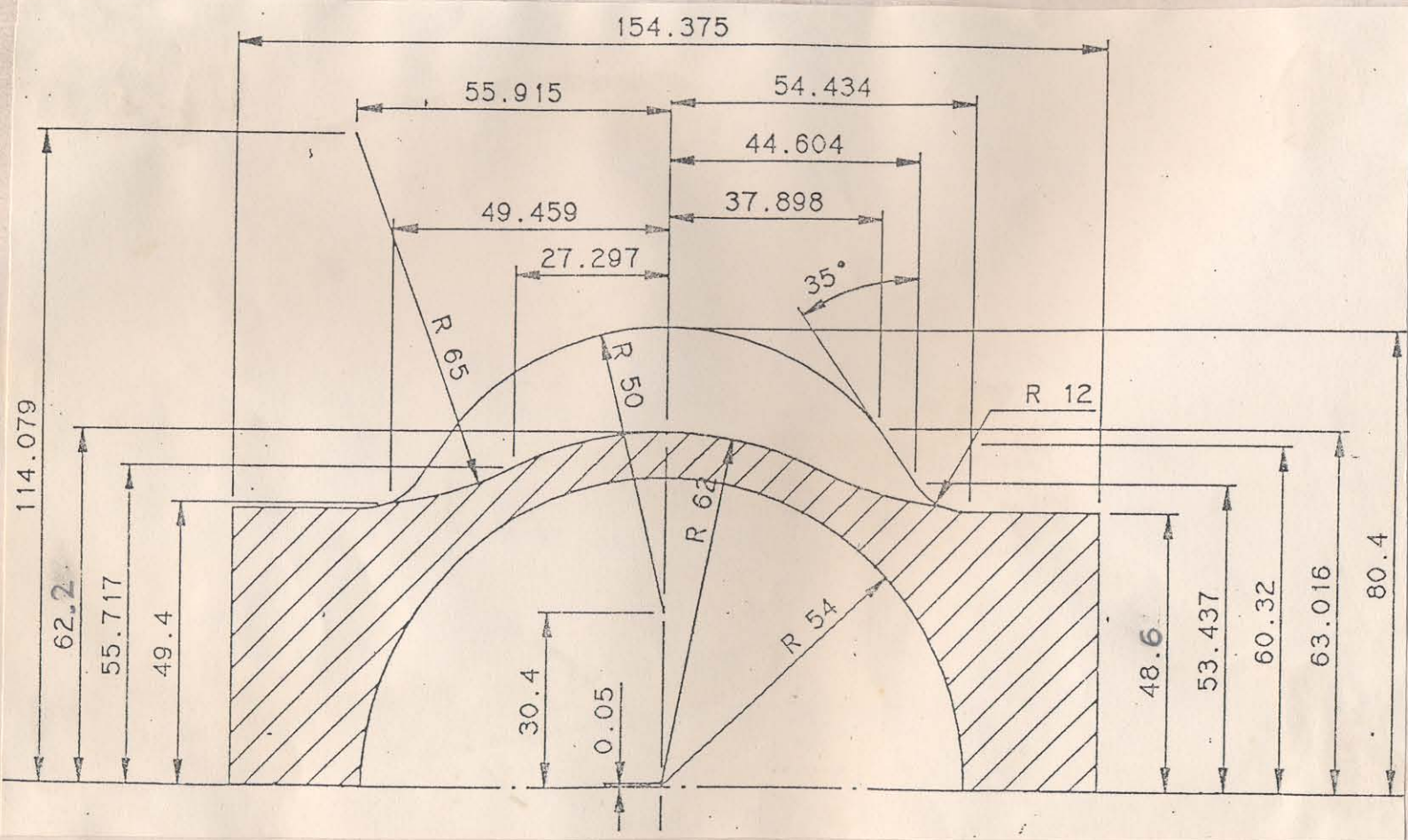
TECHNICAL REQUIREMENTS

1. Variation in dimension 'A' - 'A' should not exceed 0.25 mm
2. * Dimension are for reference.

DES	APP	083	1	6.4.99
PREP	END	APPD	P&TE-REF	ISSUE DATE

CAD DRAWING
COORDINATE DIMENSION

MACHINE: HMC_600



STD. TOOLS&GAUGES

SPECIAL TOOLS&GAUGES

DESIGNED	CHKD	APPD	P&TE-REF	ISSUE	DATE

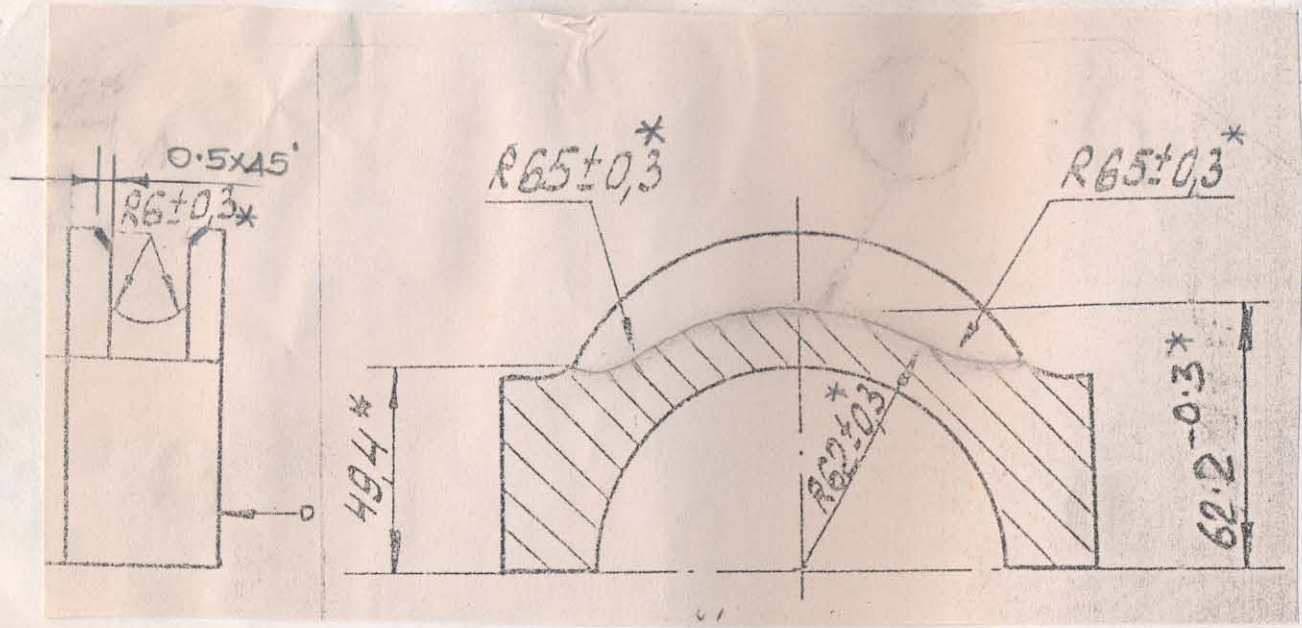
Ra10

MACHINE: BENCH

STD. TOOLS & GAUGES

1. Pneumatic Grinder
2. polishing wheel
3. Mounted points
4. Half round file 150 mm
5. Bench vice

SPECIAL TOOLS & GAUGES

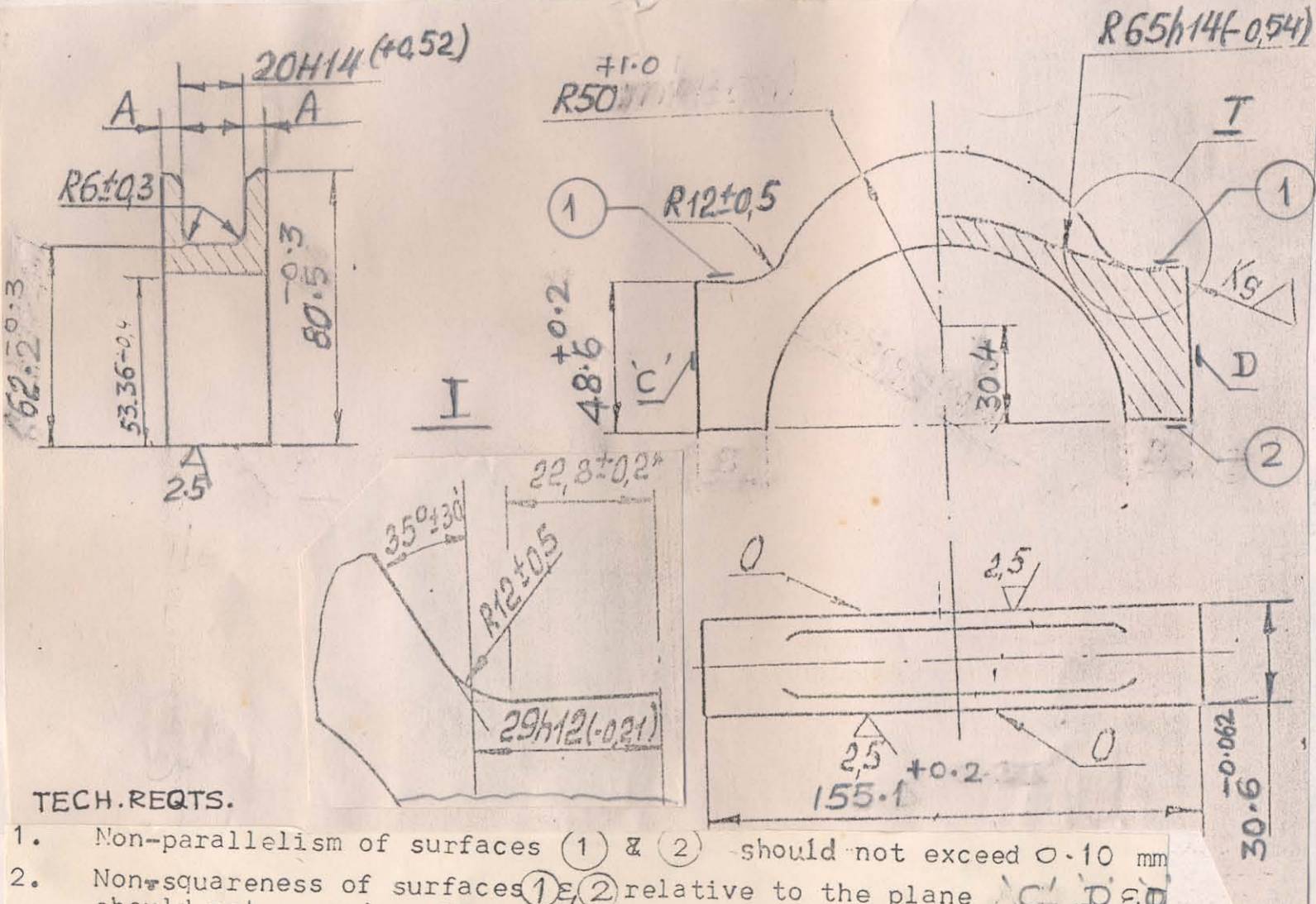


1. * DIMENSIONS ARE FOR REFERENCE.
2. Tool marks are not allowed on all profiles.

REC	CHD	APPD	P&TE-REF	ISSUE	DATE
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MACHINE: BENCH

STD. TOOLS & GAUGES



SPECIAL TOOLS & GAUGES

- | | |
|--------------------------|--------|
| 1. Profile gauge R60xR65 | 203069 |
| 2. -do- R50 | 203074 |
| 3. -do- R12x35 | 203031 |
| 4. -do- R29xR12x35 | 203073 |

TECH. REQTS.

1. Non-parallelism of surfaces (1) & (2) should not exceed 0.10 mm
2. Non-squareness of surfaces (1) & (2) relative to the plane C, D, & D should not exceed 0.20 mm.
3. Variation in dimension A - A should not exceed 0.2 mm

4.* Dimensions for reference.

PREP	CHKD	APPD	P&T REF	ISSUE	DATE
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