



ENGINE FACTORY, AVADI

PROCESS SCHEDULE

DESCRIPTION :- **EXHAUST CAM SHAFT GEAR**

COMPT. No :- **307-16-2**

MFG. SHOP :- **SPS**



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE

NOMENCLATURE : EXHAUST CAMSHAFT GEAR
 DRAWING No : 307-16-2
 MATL. SPECIFICATION : STEEL STAMPING - STEEL 12X H3A

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
000	FORGING	6				
010	HEAT TREATMENT - TO BE NORMALIZED TO BHN \geq 255.	-	H.T.P.			
020	INSPECTION	-	BENCH			
030	TURNING	7	C/LATHE NH-26/1000 HMT			
040	TURNING	8	CNC-LATHE GDM-65/2A HMT			
050	EXTERNAL GRINDING	9	CYL-GRNDG MIC-HMT. K-130/800P.			THIS SHT. IS REMOVED.
060	TURNING	10	CNC-LATHE GDM-65/2A HMT			
070	SURFACE GRINDING	11	SURFACE GRNDG-MIC-PRAGA.			

PREPARED BY		CHECKED BY		APPROVED BY		AUTHORISED BY								SHT. No	
SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	<i>[Signature]</i>									1 OF 25
DATE	29/10/96	DATE	30.10.96	DATE	30.10.96	20/10/96									
	Car I /PDO		<i>[Signature]</i> /PDO			DO/PDO		024	1	9-4-97	<i>[Signature]</i>				
								PDO REF	ISSUE	DATE	SIGN				



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE

NOMENCLATURE

DRAWING No

: 307-16-2

MATL. SPECIFICATION

:

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
080	WASHING		WASHING PLANT			
090	INSPECTION	12	BENCH			
100	GEAR HOBGING	13	GEAR HOBGING MIC. HMT - H-400.			
110	TOOTH ROUNDING	14	TOOTH ROUNDG. MIC. PENTAGON.			
120	WASHING	-	WASHING PLANT			
130	INSPECTION	15	BENCH			
135	COPPER PLATING	16	E.P.S.			
140	HEAT TREATMENT: CARBURIZING	16	H.T.P.			

PREPARED BY		CHECKED BY		APPROVED BY		AUTHORISED BY						SHT. No 2 OF 25
SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	<i>[Signature]</i>						
DATE	29/10/96	DATE	30.10.96	DATE	30.10.96	30/10/96						
	em I /PDO		cmg /PDO		HOS/PDO	DO/PDO		PDO REF	ISSUE	DATE	SIGN	



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE

NOMENCLATURE :

DRAWING No : 307-16-2

MATL SPECIFICATION :

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
220	HEAT TREATMENT : HARDENING & TEMPERING	21	H.T.P.			
230	INSPECTION		BENCH			
250	INTERNAL GRINDING	22	INT. GRNDG. MIC - NOVA/ PARISHUDH			
260	TURNING	23	C/LATHE NH-26/1000 HMT			
270	DRESSING	24	BENCH			
280	INSPECTION : CRACK TEST & DEMAGNETIZE	-	MAGNETIC FLAW DETECTOR			
290	WASHING	-	WASHING PLANT			
300	FINAL INSPECTION	25	BENCH			

PREPARED BY		CHECKED BY		APPROVED BY		AUTHORISED BY						SHT. No 4 OF 25
SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	<i>[Signature]</i>						
DATE	29/10/96	DATE	30.10.96	DATE	30-10-96	<i>[Signature]</i>						
	CuI /PDO		<i>[Signature]</i> /PDO		HOS/PDO		DO/PDO	PDO REF	ISSUE	DATE	SIGN	



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE

NOMENCLATURE :

DRAWING No : 307-16-2

MATL SPECIFICATION :

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
310	OXIDATION : CHEMICAL OXIDIZING AND OIL FINISHING (SPARES ONLY)	-	H.T.P / EPS.			
320	MARKING : MARK PART No.	-	BENCH.			
330	INSPECTION	-	BENCH			

PREPARED BY		CHECKED BY		APPROVED BY		AUTHORISED BY								SHT. No
SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	SIGN	<i>[Signature]</i>	<i>[Signature]</i>								5 OF 25
DATE	29/10/96	DATE	30.10.96	DATE	30.10.96	30.10.96								
	CMJ /PDO		CMJ /PDO		HOS/PDO	DO/PDO								
								PDO REF	ISSUE	DATE	SIGN			

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

NOMENCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.
307.16.2

ISSUE
8

OPN. No.
000

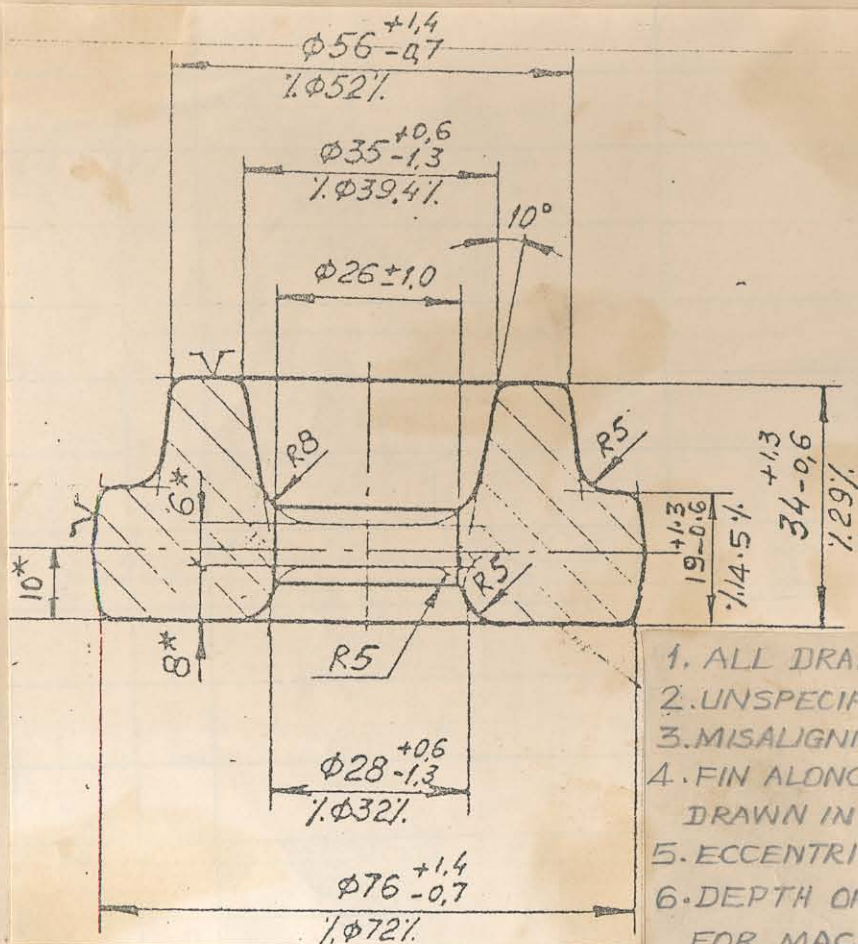
OPERATION
STAMPING DRG

STEEL 12XH3A

NORMALIZED AND HIGH
TEMPERED TO BHN 196-241

MACHINE:-

STD. TOOLS & GAUGES



TECH. REQTS:

1. ALL DRAFTS TO BE 6°
2. UNSPECIFIED RADII TO BE 2mm.
3. MISALIGNMENT (SHIFT OF DIE AXES) UPTO 0.6mm.
4. FIN ALONG DIE PARTING UPTO 0.8mm. FIN DRAWN INTO HOLE UPTO 5mm HIGH.
5. ECCENTRICITY OF PIERCED HOLE UPTO 1mm.
6. DEPTH OF DEFECTS UPTO HALF OF ALLOWANCE FOR MACHINING.
7. CURVATURE AND DISTORTION UPTO 1.0mm.
8. TO BE MARKED WITH STEEL GRADE INCASE ALTERNATE MATL. IS USED.
9. MATERIAL - STEEL 12XH3A.

SPECIAL TOOLS & GAUGES

PRED.	CHD.	APPD

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

NC. INCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.
307.16.2

ISSUE

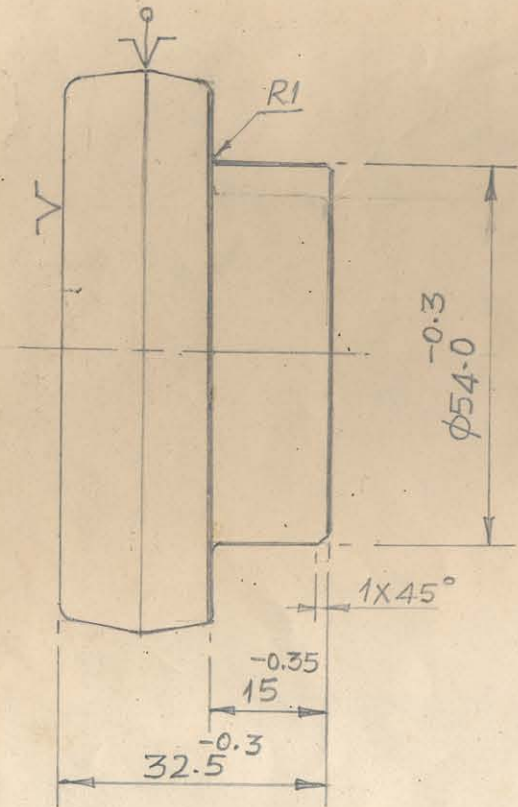
OPN. No.
030

OPERATION
TURNING

STEEL 12XH3A.
HARDNESS BHN \geq 255.

Ra 10/

MACHINE: CENTRE LATHE
HMT - NH - 26/1000



STD. TOOLS & GAUGES

TURNING & FACING TOOL.	PCLNR 2525 12
INSERT CNMG	120408

SPECIAL TOOLS & GAUGES

PRED.	CHD.	APPD

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

NOMENCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.
307.16.2

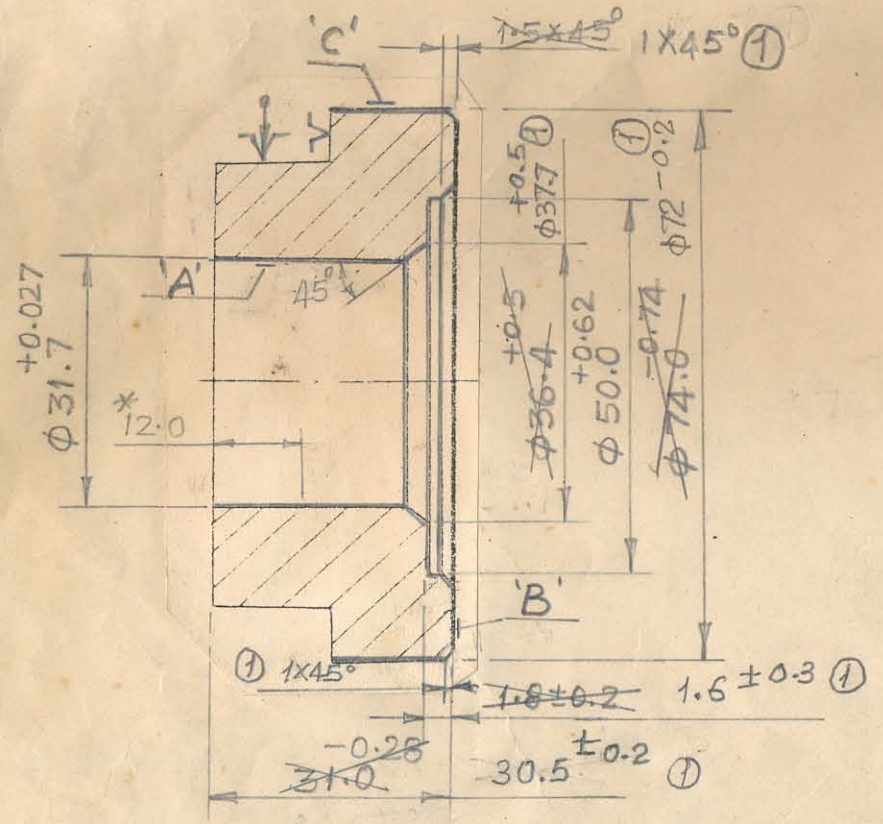
ISSUE

OPN. No.
040

OPERATION
TURNING

Ra.5/

MACHINE: CNC-LATHE
HMT-GDM-65/2A



STD. TOOLS & GAUGES

T&F TOOLING	PCLNR
INSERT CNMG	252512
PILOT DRILL	120408
DRILL	φ26
	φ31
BORING TOOL	6938795410
INSERT CCMT	090304

SPECIAL TOOLS & GAUGES

PLUG GAUGE	20/08/37
φ31.7 ^{+0.027}	
SOFT JAWS.	200536
SNAP GAUGE	025/03/77
30.5 ^{-0.2}	

NOTE: - (a) *BLACKNESS (UNMACHINED SURFACE) IS ALLOWED UPTO φ37 TO A LENGTH OF 12 MM WHEN VIEWED FROM SPLINE SIDE.

(b) TOOLS ARE COVERED UNDER TOOLING PACKAGE FOR 40 COMPTS.

(1) TR (i) RUN OUT OF SURFACE 'B' RELATIVE TO AXIS OF SURFACE 'A' SHOULD NOT EXCEED 0.02 mm.

(ii) PERMISSIBLE RUN OUT OF SURFACE 'C' RELATIVE TO HOLE AXIS IS 0.08 mm.

PRED.	CHD.	APPD

024	1	9.4.97	
PDO REF	ISSUE	DATE	SIGN

PLANNING SHEET-PDO/EFA

FORM No: EFA/P-039

111
NOMENCLATURE

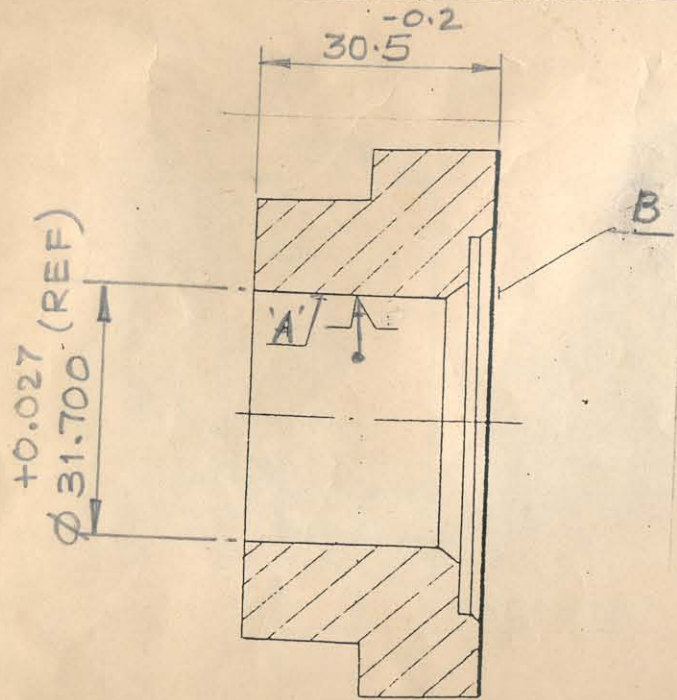
EXHAUST CAMSHAFT GEAR

DRAWING No.
307.15.2

ISSUE
E

OPN. No.
050

OPERATION
GRINDING



Ra 5 / 7

MACHINE:
CYLINDRICAL
GRINDING M/C
HMT K130/800P.

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

EXPANSION
MANDREL } $\phi 31.7$ } +0.027 } 401572

SNAP GAUGE } 30.5 } -0.2 } 025/03/77

TECH. REQ:-

RUNOUT OF SURFACE 'B' RELATIVE TO AXIS OF SURFACE 'A' SHOULD NOT EXCEED 0.02 mm.

① THIS OPN. IS DELETED

			024	1	9.4.97	
PRED.	CHD.	APPD	PDO REF	ISSUE	DATE	SIGN

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

NOMENCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.
307.16.2

ISSUE
B

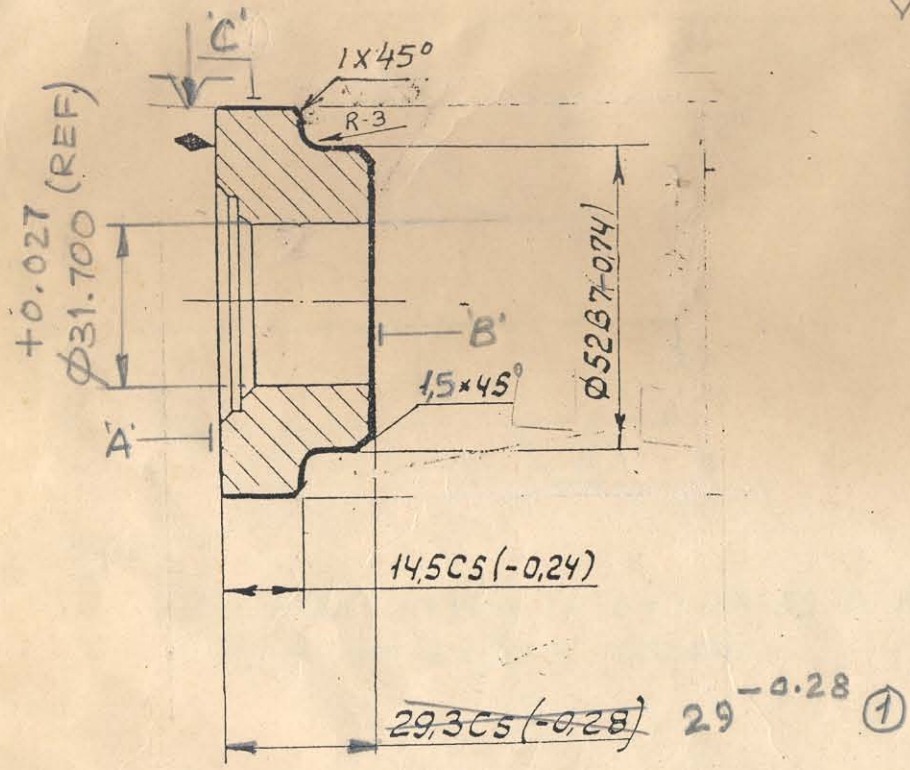
OPN. No.
060

OPERATION
TURNING

$\nabla 5 = Ra5$

Ratio (✓)

MACHINE: CNC-LATHE
HMT-GDM-65/2A



TECH. REQT:-

PERMISSIBLE RUNOUT OF SURFACE 'C' RELATIVE TO HOLE AXIS IS 0.08 mm.

① NON PARALLELISM OF END FACE 'A' & 'B' SHOULD NOT EXCEED 0.02 mm.

STD. TOOLS & GAUGES

TURNING &	PCLNR
FACING TOOL.	252512
INSERTS CNMG	120408

SPECIAL TOOLS & GAUGES

① EXPANSION MANDREL	401572
φ 31.7 ± 0.027	
SNAP GAUGES	
i) φ 72.0 ^{-0.2}	026/01/106
ii) 14.5 ^{-0.24}	025/02/194
① SOFT JAWS	200536

QSV	<i>[Signature]</i>	<i>[Signature]</i>	024	1	2.4.97	<i>[Signature]</i>
PRED.	CHD.	APPD	PDO REF	ISSUE	DATE	SIGN

PLANNING SHEET - PDO/EFA

FORM No: EFA/P-039

NOMENCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.

307.16.2

ISSUE

B

OPN. No.

070

OPERATION

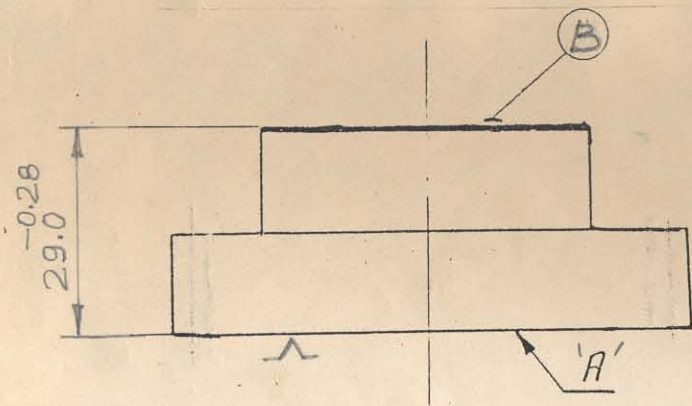
GRINDING

MACHINE: SURFACE GRINDING M/C

Ra 5/

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES



TECH. REQT: -

NON-PARALLELISM OF END-FACES 'A' AND 'B' SHOULD NOT EXCEED 0.02mm

① THIS OPERATION IS OPTIONAL

QSV	QSV	QSV	024	1	9.4.97	QSV
PRED.	CHD.	APPD	PDO REF	ISSUE	DATE	SIGN

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

NOMENCLATURE

EXHAUST CAMSHAFT GEAR

DRAWING No.
307.16.2

ISSUE
B

OPN. No.
090

OPERATION
INSPECTION

MACHINE:
BENCH

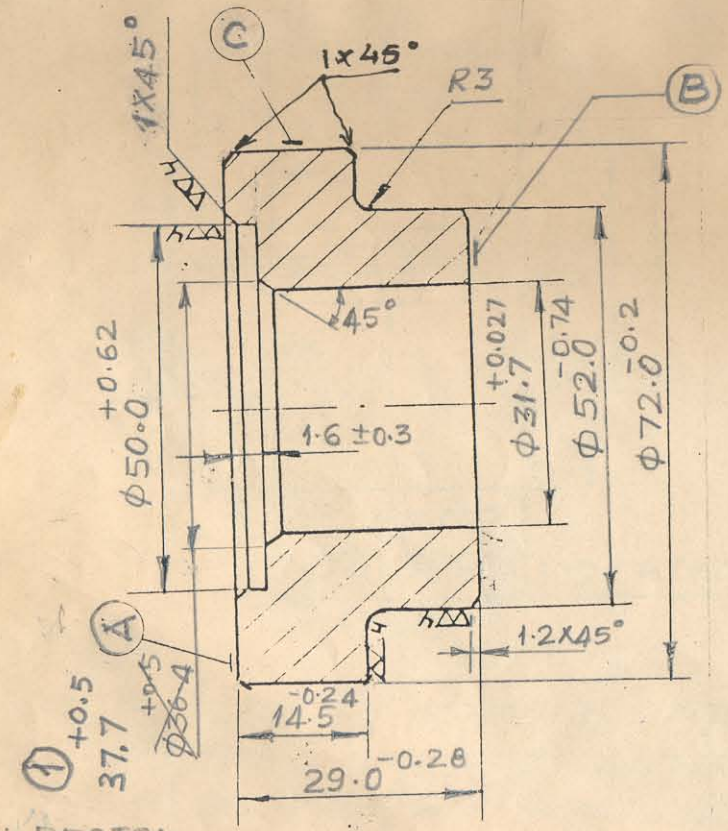
STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

- PLUG GAUGE
φ 31.7 +0.027 020/08/37
- SNAP GAUGES
- i) φ 72.0^{-0.2} 026/01/106
- ii) 14.5^{-0.24} 025/02/194
- MANDREL 08/00/22

∇A = Ra10

Ra5/∇(A)



TECH. REQTS:-

- (i) RUNOUT OF END FACE (A) RELATIVE TO THE AXIS OF HOLE SHOULD NOT EXCEED 0.02 mm.
- (ii) RUNOUT OF SURFACE (C) RESPECT TO AXIS OF HOLE SHOULD NOT EXCEED 0.08 mm.
- (iii) NON-PARALLELISM OF END FACES (A) AND (B) SHOULD NOT EXCEED 0.02 mm.

PRED.	CHD.	APPD	024	1	9.4.97	SIGN
			PDO REF	ISSUE	DATE	