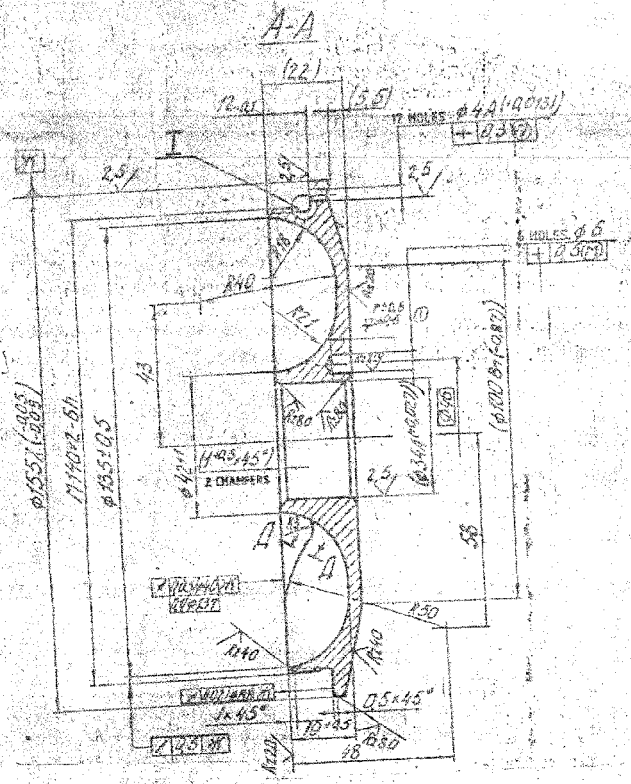
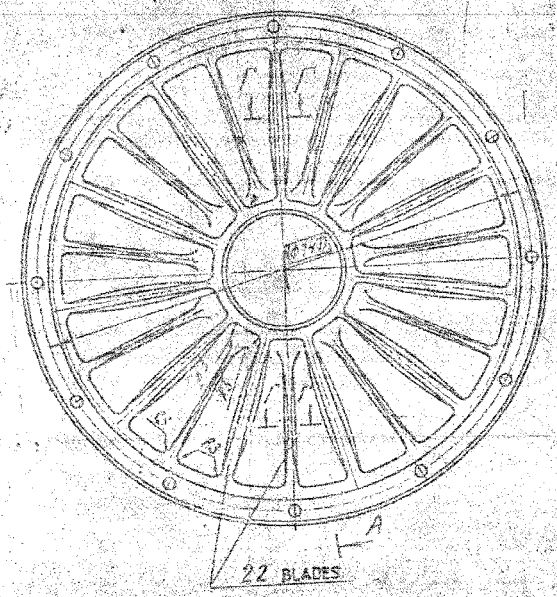
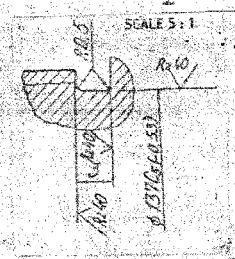
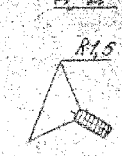
DRAWING NUMBER
172 47 238

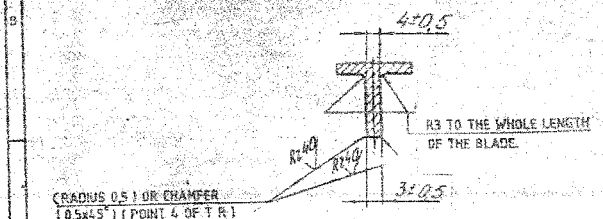
1. BHN ≥ 90 DIA OF INDENTATION 1000 ≤ 3,7
2. UNSPECIFIED LIMIT DEVIATIONS SHOULD BE AS PER ACCURACY CLASS 7
3. DIMENSIONS GIVEN IN BRACKETS ARE TO BE ENSURED AFTER ASSEMBLY
4. RADIUS 0,5 OR CHAMFER 0,5 x 45° IS TO BE MADE ON THE ENTIRE CONTOUR
5. OTHER REQUIREMENTS ARE AS PER 520 LY 1
6. RUNOUT OF THE PITCH DIAMETER OF THREAD RELATIVE TO SURFACE "A" MAY BE 0.05 mm MAX.











EXPLANATORY NOTE :-

7 REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AK4 GOST 21488-76. MADE FROM ALUMINIUM ALLOY BARS WITHOUT HEAT-TREATMENT, (HOT EXTRUDED) TO GRADE AK4 GOST 21488-76 WITH NORMAL ACCURACY ON DIAMETER AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74.

a) CHEMICAL COMPOSITION AS PER GOST 4784-74.

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)			EITHER ANY ONE IMPURITY INDIVIDUALLY	TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti		
AK4	BASE	1.90 TO 2.50	1.40 TO 1.80	0.80 TO 1.30	0.80 TO 1.30	0.50 TO 1.20	0.20	0.30	0.10	0.50	0.10

b) MECHANICAL PROPERTIES AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH Kgf/mm²	ELONGATION %
	MINIMUM	
AK4	36.0	8.0

ALTERNATE MATERIAL:-

ALUMINIUM ALLOY GRADE 22588 TO IS:734-75

AUTHORITY:- CQA(HV) LETTER NO:-

091/IFD/IND-V/MTPP/OE dt: 24-03-05

MASTER COPY

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

EST. WT.	TO BE STAMPED OR MARKED WHERE INDICATED THUS * (LETTERS)
0,395	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R. OUT - SIDE R. INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
1A	22.3.99	D.O. CORRECTION

DRN	A. Dhas
CHD	[illegible]
TED	A. Dhas
APPD	V. Ramesh
DATE	01-6-94
SCALE	1 : 1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	
ALL THREADS TO CONFORM TO	

MATERIAL :- ALUMINIUM ALLOY AK4 GOST 21488-76.

USED ON (A)
172 47 015 Cb (FOR REF)
172 47 040 Cb

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)
AVADI

TITLE : IMPELLER

D S CAT NUMBER

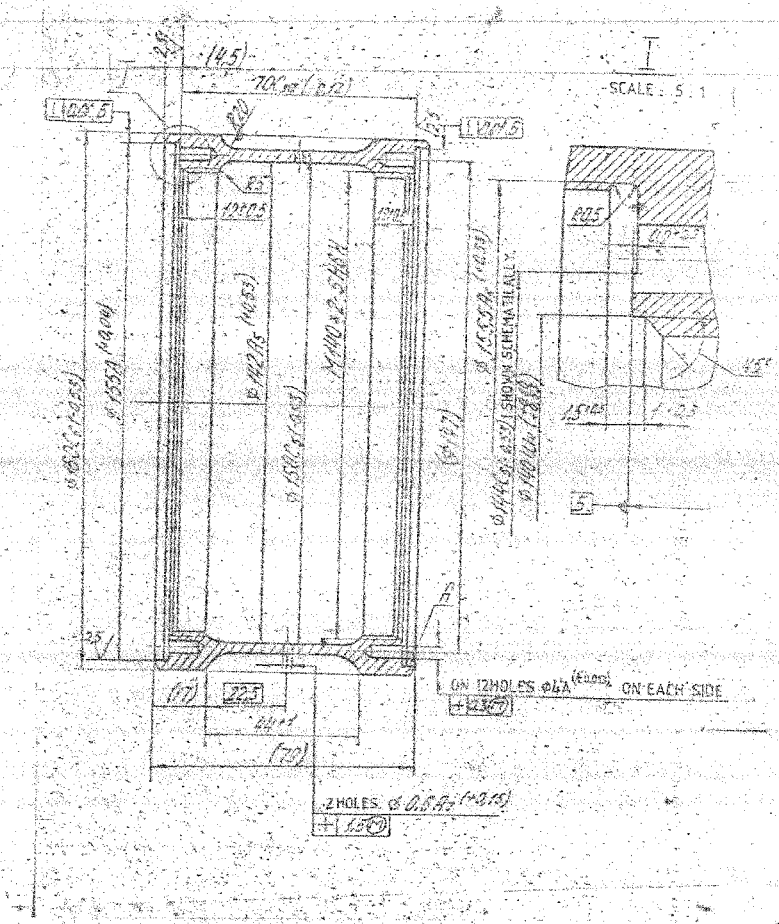
DRAWING NUMBER
172 47 238

DRG REDRAWN BASED ON INDIANISED DRG ISSUE-1

F 69
65

SIZE A2

DRAWING NUMBER
172 47 239



1. BHN ≥ 90° DIA OF INDENTATION ≤ 3.7 AT AN EFFORT OF 1000 Kg
2. DIMENSIONS GIVEN IN BRACKETS ARE TO BE PERFORMED AFTER ASSEMBLY.
3. WHILE MAKING HOLES ⌀ 0.6A2, IT IS ALLOWED TO DRILL ⌀ 2 TO A DEPTH NOT EXCEEDING 2 mm.
4. RUN-OUT OF SURFACE " A " RELATIVE TO THE PITCH DIAMETER OF THREAD SHOULD NOT EXCEED 0.05 mm. ON EACH SIDE OF THE COMPONENT.
5. MISALIGNMENT OF PITCH DIAMETERS OF THREADED HOLES SHOULD NOT EXCEED 0.15 mm.
6. OTHER REQUIREMENTS ARE AS PER 520 TY1.
7. IT IS ALLOWED TO MAKE CHAMFER AT 45° ANGLE ON THE TRANSITION OF SURFACE ⌀ 144 C_5 TO THE FACE, AND INSTEAD OF RADII R 0.5 MAKE CHAMFER 0.25 × 45° IN THE GROOVE.

EXPLANATORY NOTE :-

8. REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AK4 GOST 21488-76 MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT TREATMENT (NOT EXTRUDED) TO GRADE AK4 GOST 21488-76, WITH NORMAL ACCURACY AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74.

a) CHEMICAL COMPOSITION AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)				
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti	OTHER IMPURITIES EACH (MAX)	TOTAL
AK4	BASE	1.90 2.50	1.40 1.60	0.80	0.80 1.30	0.50 1.20	0.20	0.30	0.10	0.50	0.10

b) MECHANICAL PROPERTIES AS PER GOST 21488-76.

GRADE OF ALLOY	TENSILE STRENGTH Kgf/mm²	ELONGATION %
	MINIMUM	
AK4	36.0	8.0

ALTERNATE MATERIAL:-

1) ALUMINIUM GRADE 22588 TO IS:734-75

AUTHORITY:- CQA(HV) Le Her No: 981/IFD/IND-V/MTPF/10E dt 24-03-2005

2) ALUMINIUM GRADE 24345 (HE15) TO IS:733-75

AUTHORITY:- CQA(HV) Le Her No - 83047/COUPLING-IND I dt 15-10-2004

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

EST. WT.	TO BE STAMPED OR MARKED WHERE INDICATED THUS (LETTERS)
0.336	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE & EQUIVALENT CHAMFERS AP RMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS

DRN	
CHD	
TCD	
APPD	V. Rao
DATE	13-08-96
SCALE	1:1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	
ALL THREADS TO CONFORM TO	

MATERIAL :- ALUMINIUM ALLOY AK4 GOST 21488-76

USED ON 172 47 040 05

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE :- BAND

D.S. CAT NUMBER

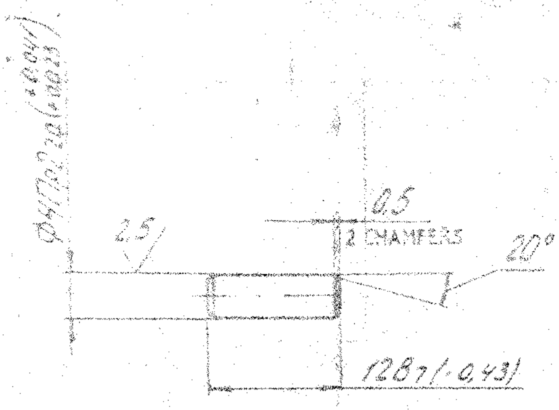
DRAWING NUMBER 172 47 239

DRAWING PREPARED BASED ON APPROVED DRAWING ISSUE - NIL

F.89 46

SIZE A2

DRAWING NUMBER 172 47 240



Rz 80 √ (√)

EXPLANATORY NOTE

4 REFERENCE MATERIAL QUOTED : ALUMINIUM ALLOY AK4 GOST 21488-76 AND ALTERNATIVELY , ALUMINIUM BAR Д16T OR AK4T1 GOST 21488-76.

ALUMINIUM ALLOY BAR WITHOUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 AND ALTERNATIVELY ALUMINIUM ALLOY BAR AK4T1 (HARDENED AND NATURALLY AGED) TO GOST 21488-76 AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74

(a) CHEMICAL COMPOSITION : AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS %							IMPURITIES %						
	Al	Cu	Mg	Ni	Fe	Si	Ti	Mn	Zn	Ti	Si	Cr	OTHER IMPURITIES EACH INDIVIDUAL	TOTAL
								MAXIMUM						
AK4	BASE	1,90 2,50	1,40 1,80	0,80 1,30	0,80 1,30	0,50 1,20	—	0,20	0,30	0,10	—	—	0,05	0,1
AK4T1	BASE	1,90 2,70	1,2 1,8	0,8 1,4	0,8 1,4	—	0,02 0,10	0,20	0,30	—	0,35	0,1	0,05	0,1

MASTER COPY

(b) MECHANICAL PROPERTIES : AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH Kgf/mm²	ELONGATION %	YIELD POINT Kgf/mm²
	MINIMUM		
AK4	36,0	8,0	—
AK4T1	40,0	6,0	32,0

1 ALTERNATE MATERIAL : ALUMINIUM BAR Д16T OR AK4T1 GOST 21488-76 HARDNESS IS NOT TO BE CHECKED

2 BHN ≥ 95 DIA OF INDENTATION ≤ 1,8 WITH 5 mm BALL AND EFFORT OF 250 Kg TO BE CHECKED ON ONE COMPONENT FROM THE BATCH

3 OTHER REQUIREMENTS ARE AS PER 520 TY 1

ALTERNATE MATERIAL:
ALUMINIUM ALLOY GRADE 22588 TO IS:734-75
AUTHORITY:- CQA(HV), Letter NO:
091/IFD/IND-V/MTPF/OE dt: 24-03-2005

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION

EST. WT.	TO BE STAMPED OR MARKED WHERE INDICATED THUS (LETTERS)
0,001	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED. MACHINED CORNERS TO HAVE R ... SIZE. ... ARE PERMISSIBLE

DRN	A. Thomas
CHD	[illegible]
TCD	A. Thomas
APPD	V. Ramesh
DATE	18 - 8 - 94
SCALE	2 : 1

DIMENSIONS & TOLERANCE ON DIMN. UNLESS OTHERWISE STATED ... ALL THREADS TO CONFORM TO

MATERIAL:- ALUMINIUM ALLOY AK4 GOST 21488-76

USED ON 172 47 015 C5

CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES) AVADI

TITLE DOWEL

S CAT NUMBER

DRAWING NUMBER 172 47 240

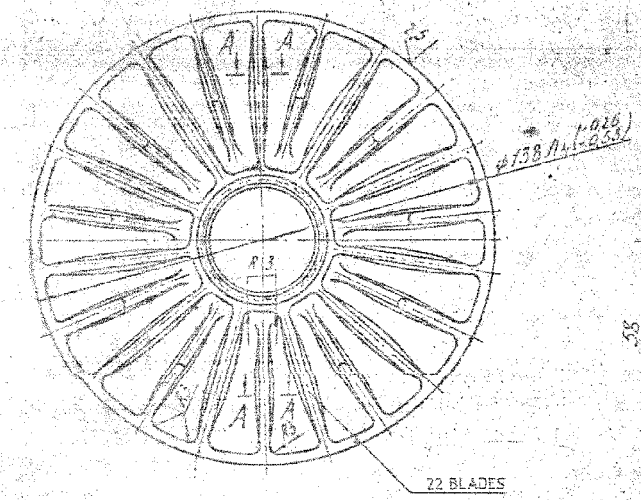
ISSUE DATE | NATURE OF AMENDMENTS

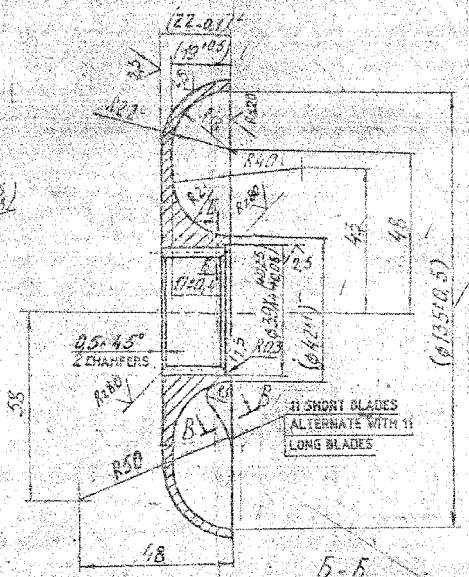
F 89 47

SIZE A3

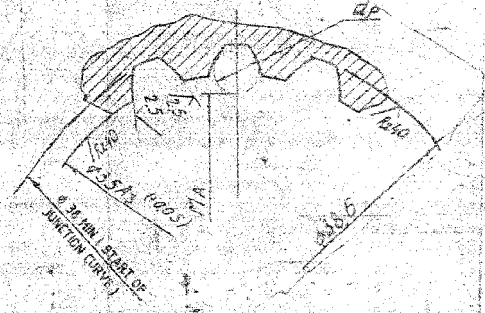
DRG REDRAWN BASED ON INDIANISED DRG ISSUE - NIL

DRAWING NUMBER
172 47 241

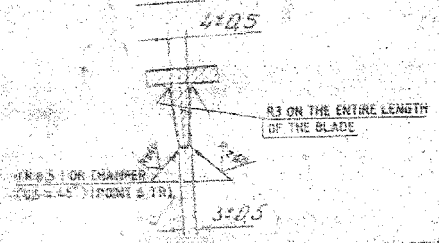




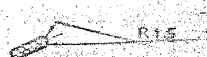
Б-Б
SCALE 5 : 1



A-A



B-B



(2)	DESIGNATION OF HOLE AS PER GOST 6033-51		3638 x 1,5 x 24
	MODULE	m	1,5
	NUMBER OF TEETH	Z	24
	ANGLE OF PROFILE	α	30°
	PIN DIAMETER	dp	2,886 ± 0,007
	DISTANCE OVER PINS	M_A	$34,8^{+0,19}_{+0,03}$
	TROTH SPACE WIDTH ALONG THE ARC OF THE REFERENCE CIRCLE	S_a	$2,645^{+0,02}_{-0,01}$
	REFERENCE DIAMETER	dd	36

1. BHN @ 90° DIA OF INDENTATION ≤ 3,7 AT EFFORT OF 1000 Kg
2. UNSPECIFIED LIMIT DEVIATIONS SHOULD BE AS PER ACCURACY CL ASS 7
3. DIMENSIONS GIVEN IN BRACKETS ARE TO BE ENSURED AFTER ASSEMBLY
4. TEETH (SPLINES) SHOULD BE CHECKED BY A COMPLEX GAUGE WITH TOLERANCES AS PER GOST 6528-53
5. RUN-OUT OF SPLINES RELATIVE TO THE AXIS OF DIAMETER 135 ± 0,5 SHOULD NOT EXCEED 0,5 mm.
6. R 0,5 OR CHAMFER 0,5 x 45° IS TO BE MADE ON THE ENTIRE CONTOUR ON ALL BLADES
7. OTHER REQUIREMENTS ARE AS PER S20 TY 1

EXPLANATORY NOTE :-

a) REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AK4 GOST 21488-76 MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 GOST 21488-76. WITH NORMAL ACCURACY ON DIAMETER AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74

a) CHEMICAL COMPOSITION AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)				
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti	OTHER IMPURITIES EACH INDIVI. DUALLY	TOTAL
AK4	BASE	1.90 2.50	1.40 1.60	0.80 1.30	0.80 1.30	0.50 1.20	0.20	0.30	0.10	0.05	0.10

b) MECHANICAL PROPERTIES AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH Kgf/mm²	ELONGATION %
	MINIMUM	
AK4	36.0	8.0

ALT MATL AL ALLOY GR. 22588 IS: 734-75
AUTHY. CQA (HV) letter no DPI/IPD/IND-V/MTPF/OE dtd 24.03.05

PILOT SAMPLE SHOULD BE APPROVED BY A H'S P BEFORE BULK PRODUCTION.

EST. WT.	TO BE STAMPED OR MARKED WHERE INDICATED THUS ! (LETTERS)
0.340	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT - SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE

ISSUE	DATE	NATURE OF AMENDMENTS
2	17.12.86	Amdt List No.6 Part II Book 18

DRN	B. Tech
CHD	
TCD	B. Tech
APPD	M. Ramesh
DATE	26 - 7 - 96
SCALE	1 : 1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	
ALL THREADS TO CONFORM TO	

MATERIAL :- ALUMINIUM ALLOY AK4 GOST 21488-76

USED ON 172 47 042 C6 C8

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE : TURBINE WHEEL

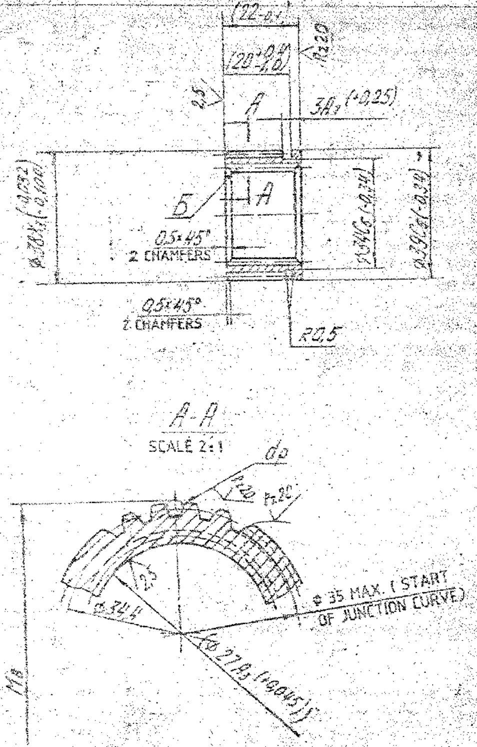
D'S CAT NUMBER

DRAWING NUMBER 172 47 241

SIZE A2

DRAWING NUMBER 172 47 242

Rz 40



DESIGNATION OF SHAFT ~~AS PER GOST 6033-51~~ ①		36 38×1.5×24 ~~36 38×1.5×24×5~~ ①
MODULE	m	1.5
NUMBER OF TEETH	Z	24
ANGLE OF PROFILE	do	30°
PIN DIAMETER	dp	3.310 ± 0.001
DISTANCE OVER PINS	MB	42.94 -0.10 -0.06
TOOTH THICKNESS ALONG WITH THE ARC OF THE REFERENCE CIRCLE	Sa	2.645 +0.07 +0.04
REFERENCE DIAMETER	da	36

1. BHN 375 - 302 (DIA. OF INDENTATION 3.2 - 3.5 .
2. DIMENSIONS GIVEN IN BRACKETS AND SPLINES ' Б ' SHOULD BE ENSURED AFTER ASSEMBLY.
3. TEETH (SPLINES) SHOULD BE CHECKED BY COMPLEX GAUGE WITH TOLERANCES AS PER GOST 6528-53.
4. OTHER REQUIREMENTS ARE AS PER 520 (Y-1

EXPLANATORY NOTE :-

5. REFERENCE MATERIAL QUOTED :- STEEL 38XC GOST 4543-71 STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL GRADE 38XC GOST 4543-71

a) CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543-71

CONTENT OF ELEMENTS %				RESIDUAL CONTENTS %				
C	Si	Mn	Cr	S	P	Cu	Ni	Cr
				MAXIMUM				
0.34-0.42	1.0-1.4	0.30-0.60	1.30-1.60	0.035	0.035	30	30	30

b) MECHANICAL PROPERTIES : AS PER STEEL GRADE 38XC GOST 4543-71

TENSILE STRENGTH Kgf/mm²	YIELD POINT Kgf/mm²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgf/cm²
MINIMUM				
95	75	12	50	7

ALT. MATL. Steel 817M40 (EN-24) BS:970-83
AUTHY. CQA(HV) letter no. 091/IPD/INDIV/MTPF/OE dtd. 17.03.05

MASTER COPY

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

EST. WT.	TO BE STAMPED OR MARKED WHERE INDICATED THUS *
0.076	(LETTERS)

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
1	17-12-88	AMDT. LIST No. 6, PART II BOOK-8

DRN	
CHD	
TCD	
APPD	
DATE	06-07-94
SCALE	1:1
DIMENSIONS IN mm.	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	
ALL THREADS TO CONFORM TO	

MATERIAL :- STEEL 38XC GOST 4543-71

USED ON :- 172 47 042 CBCB

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE: SPLINED BUSH

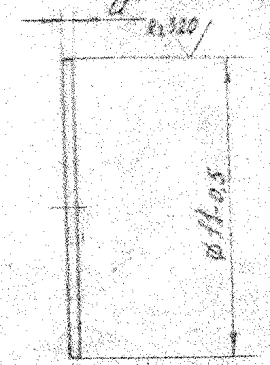
D S CAT NUMBER

DRAWING NUMBER 172 47 242

DRG. REDRAWN BASED ON INDIANISED DRG. ISSUE - 1

SIZE A3

DRAWING NUMBER
172 47 243



1 * DIMENSION FOR REFERENCE

2 OTHER REQUIREMENTS ARE AS PER 520 TY 1

PART No	a	MATERIAL	WEIGHT
172 47 243	0,3	STRIP Y7A-C-0,3 x 60 GOST 2283-69	0,0002
172 47 243 - 01	0,5	STRIP Y7A-C-0,5 x 60 GOST 2283-69	0,0004

ALTERNATE MATERIAL:- 21/12/10

STEEL GRADE 70C6 TO IS:2507-75

AUTHORITY:- CQA(HV) Letter NO:-

091/IFD/IND-V/MTPF/OE dt. 17-03-2005

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION

EST. WT. SEE TABLE

TO BE STAMPED OR MARKED WHERE INDICATED THUS ⊕ (LETTERS)

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT SIDE & INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE

ISSUE DATE | NATURE OF AMENDMENTS

DRN
CHD
TCD
APPD
DATE 30-7-96
SCALE - 5 : 1
DIMENSIONS IN mm
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS-2102-69
ALL THREADS TO CONFORM TO

MATERIAL :- SEE TABLE

USED ON 172 47 001 CB

CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES) AVADI

TITLE SHIM

B. S. CAT NUMBER

DRAWING NUMBER 172 47 243

EXPLANATORY NOTE :-

1 REFERENCE MATERIAL QUOTED :- STRIP Y-7A-C , 0,3 GOST 2283-69 FOR 172 47 243 AND Y-7A-C , 0,5 FOR 172 47 243-01

COLD DRAWN TOOL AND SPRING SHEET FROM STEEL TO GRADE Y 7A-C WITH NORMAL ROLLING ACCURACY IN THICKNESS & WIDTH AND WITH RESPECT TO SURFACE LIGHT (C) HAVING THICKNESS 0,3 (FOR 172 47 243) AND 0,5 (FOR 172 47 243-01) TO GOST 2283-69 AND MANUFACTURED IN ACCORDANCE WITH GOST 1435-71

a) CHEMICAL COMPOSITION : AS PER GRADE Y-7A TO GOST 1435-71

GRADE OF STEEL	CONTENT OF ELEMENTS IN %							
	C	Mn	Si	S	P	Cr	Ni	Cu
				MAXIMUM				
Y-7A	0,65 0,74	0,15 0,30	0,15 0,35	0,020	0,030	0,12	0,12	0,20

b) MECHANICAL PROPERTIES : AS PER GRADE Y-7A TO GOST 2283-69

ULTIMATE TENSILE STRENGTH Kgf/mm²
75 - 120

MASTER COPY

ORG REDRAWN BASED ON INDIANISED ORG ISSUE - NIL

F 89 50

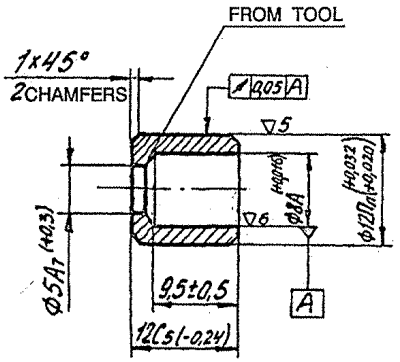
SIZE A3

DRAWING NUMBER	SHEET No 1 OF 1
175.47.011	

▽3 (▽)

(B.JAYAVELU), JTO(D)
10-08-06

"COMMON TO T-90"
DRG RE-INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - NIL



EXPLANATORY NOTE :-

REFERENCE MATERIAL QUOTED :-

TIN-FREE PRESSURE-WORKED BRONZE GRADE Бр АЖМЦ (ALUMINIUM IRON MANGANESE) 10-3-1.5 AND REFERENCE NOTE : 2 ON ALTERNATIVE MATERIAL GRADE Бр АЖ9-4 TO GOST 18175-78.

CHEMICAL COMPOSITION AS PER BRONZE GRADE Бр АЖМЦ 10-3-1.5 AND Бр АЖ9-4 TO GOST 18175-78

GRADE OF BRONZE	BASIC CONTENT OF ELEMENTS %				PARTS OF IMPURITIES BY WEIGHT % (MAX)						
	Al	Fe	Mn	Cu	Sn	Si	Pb	P	Zn	Mn	TOTAL
Бр АЖМЦ 10-3-1.5	9.0-11.0	2.0-4.0	1.0-2.0	REST	0.1	0.1	0.03	0.01	0.5	—	0.7
Бр АЖ9-4	8.0-10.0	2.0-4.0	—		0.1	0.1	0.01	0.01	1.0	0.5	1.7

1. HOLE Ø8A SHOULD BE CHECKED AT A LENGTH OF 6 mm MIN.
2. MAY BE MANUFACTURED FROM БрАЖ9-4 GOST 18175-78.

Ⓐ ALT. MATL. :- 9% Al BRONZE (M) TO IS : 6912-73

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

EST. WT. (Kg)	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
0.003	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
A	07.07.06	AUTHY.LI.No.80001/CQA(HV)/GEN/Dt.15.10.05

DRN	Sd/=
CHD	Sd/=
APPD	Sd/=
DATE	05-12-95
SCALE:-	2 : 1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102-69	
ALL THREADS TO CONFORM TO	

MATERIAL :- Бр АЖМЦ 10-3-1.5 GOST 18175-78

USED ON :- 172.47.015cbCb

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE :- BUSH

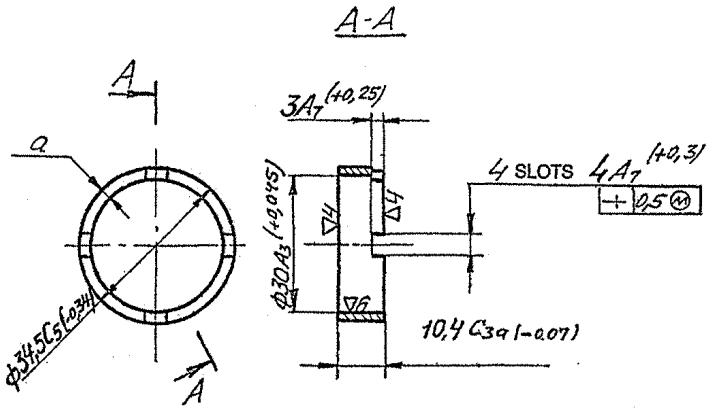
D S CAT NUMBER

DRAWING NUMBER 175.47.011

F-88
20
SIZE A3

DRAWING NUMBER	SHEET No. 1 OF 1
175.47.028	

▽3 (▽)



3.5...3.8

1. BHN 302 - 255 (DIA. OF INDENTATION) TO BE CHECKED IN BLANK.
2. DIFFERENCE IN MEASUREMENT OF DIMENSION ` a ' SHOULD NOT EXCEED 0.1 mm.

3. EXPLANATORY NOTE :-

a) REFERENCE MATERIAL QUOTED : STEEL 38XC GOST 4543-71. STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL GRADE 38XC GOST 4543-71.

b) CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543-71.

CONTENT OF ELEMENTS %					
C	Si	Mn	Cr	S	P
				MAX	
0.34 - 0.42	1.00 - 1.40	0.30 - 0.60	1.30 - 1.60	0.035	0.0356

RESIDUAL CONTENT OF COPPER AND NICKEL SHOULD NOT EXCEED 0.30% EACH

c) MECHANICAL PROPERTIES : AS PER STEEL GRADE 38XC GOST 4543-71.

TENSILE STRENGTH Kgf/mm^2	YIELD POINT Kgf/mm^2	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/cm^2
MINIMUM				
95	75	12	50	7

(3A) ALT. MATL. :- STEEL 817M40 (En 24) TO BS : 970 Part 1 : 1983

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

EST. WT. (Kg)	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
0.021	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
3A	07.07.06	AUTHY.Lt.No.80001/CQA(HV)/GEN.Dt.15.10.05.

DRN	Sd/=
CHD	Sd/=
APPD	Sd/=
DATE	03.05.95
SCALE:-	1 : 1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69	
ALL THREADS TO CONFORM TO IS : 4218,PART-4.	

MATERIAL:-	USED ON :-
STEEL 38XC GOST 4543-71	172.47.015cbCb

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE :- RING

D S CAT NUMBER

DRAWING NUMBER 175.47.028

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 3 COMMON TO T-90

(B.JAYAVELU), JTO(D) 10 - 08 - 06

F-88 32

SIZE A3

Rambabu

COPY. 6.

RESTRICTED

QUALITY ASSURANCE INSTRUCTIONS FOR COUPLING WITH HYDRAULIC SHAFT (172.47-015 CB) CQA(HV)/QAI/47/HYD. COUPLING

CONTROLLERATE OF QUALITY ASSURANCE

(HEAVY VEHICLES)

AVADI, MADRAS-600054

SQAC 6

RESTRICTED

QUALITY ASSURANCE INSTRUCTIONS

FOR

COUPLING HYDRAULIC WITH SHAFT

NO CIHV/QAI/47/HYD.COUP

Prepared by : Shri TR RAMASAMY, FM

Checked by : Maj YC MEHRA,
ASST CONTROLLER(QA)

Approved by : Col R. Jaganathan,
Joint Controller (ID).

ISSUE NO 1

DATED Jan 88

CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES)

AVADI - MADRAS 600 054

RESTRICTED

(2)

COPY 6

IMPORTANT NOTES

NOTE : 1

This is only a provisional instruction and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without the premission of Controller, CIWV, Avadi : Madras - 600 054.

NOTE : 2

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAI and the clauses in the contract, the latter will prevail.

NOTE : 3

The stores should be manufactured strictly as per the drawings supplied by the Inspection Authority only and not as per the samples, if any received by the manufacturer for guidance purpose.

NOTE : 4

Any amendment issued by the AQSF shall be incorported in the QAI and the records for the amendments carried out should be maintained as per the proforma at Appendix 'B'.

COPY 6

I N D E X

-:Ots:-

COPY 6

QUALITY ASSURANCE INSTRUCTION

No. CIHV/PROJ/QAI/173-47-015 CL-"TD C.T.B.

FOR

COUPLING HYDRAULIC WITH SHAFT

OF

TANK T-72 M1

INTRODUCTION

1. This Quality Assurance Instruction lays down the inspection and testing procedure to be carried out on COUPLING HYDRAULIC WITH SHAFT being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenous items.

2. This QAI is the property of Government of India and is liable for amendment as and when required. Controllerate of Inspection (Heavy Vehicles) Avadi, MADRAS-54 is the Authority Holding Sealed Particulars (AHSP) for this assembly. Any query/clarification on the contents of this QAI shall be referred to the AHSP. Any departure from these instructions is allowed only after written approval from above authority. Notwitstanding the tests indicated in this QAI, the inspecting officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

..2.

(5)

AIM

3. This QAI is aimed at standardizing the inspection procedure and acceptance norms for Coupling Hydraulic with shaft. It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide the authorised inspecting officer in his routine inspection and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standard.

SCOPE

4. This QAI outlines in general terms, the checks and methods to be used during inspection of Coupling Hydraulic with shaft 172-47-015 CB including the technical requirements of the drawings. The recommended Quality Assurance Programme stipulated herein are mandatory and should be strictly adhered to. For inspection purposes only the latest issue of this QAI will be made applicable and required number of copies of this QAI can be obtained from the issuing authority ie. the Controller, CIHV, Avadi, MADRAS-54.

DOCUMENTS

5. On placement of firm supply order one set of certified drawings will be forwarded to the Contractor and to the respective inspecting officer. One set of relevant specification and technical instructions on the subject item can be obtained from the AHSP.

..3

6. Any clarification required on these documents should be obtained from the AHSP. Equivalance to the collaborators specifications and standards will be decided only by the AHSP and should not be unilatorily decided. For any change in the specifications, standards or written texts, the AHSP should be approached in writing. Only based on the written approval, any alterations in specifications can be affected and not otherwise.

7. The process instruction sheets supplied by the collaborators are available with the AHSP for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.

8. The supplier after scrutiny of the concerned process sheets and connected paper particulars should establish the necessary production and inspection facilities. Particularly the inspection test rigs, stands fixtures, templates, gauges etc., should be provided as recommended in these process sheets.

LAYOUT AND FUNCTION OF THE ASSEMBLY

9 As the Starter and Generator are combined in one unit, a Starter Generator Drive System is employed (Ref Sketch 'P'). It is connected to the transmission Gear Box and meant for transmission of the drive from the starter to the engine when the unit is working as a starter and switch over the drive to work as generator drive after the engine started. The Hydraulic coupling with shaft which is dealt in this QAI is an integral part of the starter generator system (Refer Sketch 'P1'). The main sub assemblies of the Hydraulic coupling with shaft are as follows:-

(a) A fluid drive assembly consisting of driving and driven shafts coupled with impellers.

(b) A resilent coupling.

This assembly functions when the starter generator drive system is put in to use to drive the generator assembly by the rotation of impellars with the kinetic energy generated by the circulation of Oil in the impellers.

10 SAMPLING PLAN

	Pilot	Bulk
Visual	100%	100%
Material test	1 set of the test specimen	1 No per lot of 100 Nos or less
Dimensional and Interchangeability	2 sets	2 sets per lot of 100 sets or less
Inspection:		
Assemblies	1 set	1 No
Components	1 set	IL III - AQL 1.5 as per IS-2500 Pt I
Fitment & Performance on test rigs	1 set	1 No per lot of first 100 Nos and 1 No for the subsequent lot of 200 Nos.
On vehicle	1 set	1 No per lot of 250 Nos.
Preservation Packing and marking	100 %	100%

.....5..

Note:- Inspection sample size and acceptable quality level during inspection of the bulk may be changed at the discretion of the Inspector after assuring the consistency of the quality and check points adopted during manufacture.

VISUAL INSPECTION

11 The assembly and the components shall be checked for the following and should be free from any defects:

a) Fitment of all components
b) Defects in construction
c) Presence of Foreign bodies
d) Moisture and dust
e) Corrosion of metal parts
f) Any form of deterioration of materials and finishings.
g) Distortion
h) Mechanical Imperfection.

MATERIAL CHECK

12 Samples/specimen should be checked as per sampling plan. The material and the properties should conform to the relevant drawings and specifications. Alternate materials suggested by the suppliers will be considered by the ARSP (ie) Controllerate of Quality Assurance(Heavy Vehicles) AVADI Usage of such alternate material will only be with the written concurrence of the ARSP.

DIMENSIONAL CHECK

13 The dimension of the components and the over all dimension (mounting) of the assembly conform to the respective drawings. This check will be carriedout as per sampling plan. Dimensions are to be checked as called for in the drawings after assembling the components to Sub assemblies/Assemblies.

INTERCHANGEABILITY

14 The system should be interchangeable assembly-wise and component-wise. However selective fitments wherever mentioned on the documents are allowed.

.....6..

15 INSPECTION DETAILS - 172-47-015-C6

Pressure Test

1 (a) Check for Axial play with impellar and this should be between 0.4 to 0.6 mm (to be achieved by selection of adjusting rings).

(b) Check lock washer (172-47-066) for proper seating on the Groove of the driven shaft. Lock washer should not rotate.

(c) Bush to Part No 175-45-011 is press fitted. The dimension Ø 8 is to be checked after the Bush is fitted.

2 172-47-001 C6 - Impeller with Coupling Assy

(a) Dimension between the sleeves to Part No 172-47-227 after assembling should be $2^{+0.2}_{-0.05}$ (to be achieved by Grinding the sleeves to a max of 0.1 mm or by selection of sleeves).

(b) Premilinary compressor of springs after assembling should be between 1.8 mm to 2 mm (To be achieved by selecting the washers to Part No 172-47-243).

3 172-47-040-C6 - Impellar Assembly

(a) Impellars to be tightened to a torque of 40 Kgm.

(b) The assembly should be subjected to balancing either static or dynamic. The parameters should be as given in the drawing.

(c) Being a selective assembly matching marks should be stamped after balancing.

(d) Surface finishing should be checked as per the drawing.

4 172-47-041 C6 C6 - Impellar assembly

(a) The clearance between the face of Impellar and the internal holder should not exceed 0.03 mm (Refer drawing)

(b) Perpendicularity and runout should be checked as per drawing.

.....7..

5 172-47-232 - Impeller

(a) Runout and splines should be checked as per the drawing. Pin dia for checking the splines is Ø 5.493 ± 0.001 (Refer drawing No 172 47 007).

(b) Micro and macro structure tests should be carried out on the specimen of forgings at places marked in the attached sketch. P2.

6 172-47-073 - Spring

(a) Check the load rating of spring as per load diagram given in the drawing.

7 172-47-042-C6 C6 - Impeller Assembly

(a) Assembly impeller should be subjected to dynamic or static balancing as specified in the drg.

(b) Runout and teeth are to checked as specified.

8 172-47-241 - Turbine wheel

(a) Check for the dimensions of splines with pin as indicated in the drawing.

9 172-47-016 - Bush

(a) End play and runout are to confor as per drg.

10 172-47-103 - Driven shaft

(a) Splines are to be checked with pins as mentioned in the drawings.

(b) The sealing place of lockwasher to Part No 172-47-066 is to be checked as per drawing.

11 172-47-067 - Thrust Nut

(a) Check for any damages in thread and the component can be tightened freely with the mating component (ie) driven shaft.

12 172-47-071 - Adjusting ring

(a) Dimension should be checked as per the drg.

(b) Part No and thickness of washer to be etched on the component to enable easy selection for achieving the end play required.

13 172-47-233 - Impeller

(a) The threads should be free from any damages.

(b) Counter should be checked with suitable template.

(c) Micro and macro structure tests should be carried out on the specimen of forgings at places ..... marked in the attached sketch. P2

16 FITMENT AND PERFORMANCE TEST OF THE RIG

(a) The assembly should be pressure tested in a suitable test rig at a pressure of 9 - 10 Kg/Cm^2 for a duration of 3 minutes. The temperature oil should be 90° - $100^{\circ}C$ The following parameters are to be checked:

i) Oil should come out from releasing nozzle in a jet form.

ii) Leakage through rim and impellar joint should not exceed 0.5 L/minute.

iii) Leakage can be allowed through coupling Part No 172-47-001 CG and the Bush to Part No 172-47-016.

iv) Leakages/seepages are not allowed in places.

17 TEST RIGS

Suitable test rigs, templates, jigs and fixtures can be manufactured/fabricated by the supplier subject to the test parameters are met.

18 FITMENT AND PERFORMANCE TEST ON VEHICLE

The complete assembly is to be fitted with proved starter generator drive and to be checked for performance for 500 Kms. The assembly should function satisfactorily.

19 MARKING

All the components are to be marked with respective Part Nos and other markings as called for in the drawing. Suitable method of marking can be adopted. The marking should be legible.

20 PRESERVATION

(a) The surface treatment (coating) should be as called for in the drawings. Any IS/BS equivalent can be adopted subject to maintainance of the coating thickness as per drawing.

.....9..

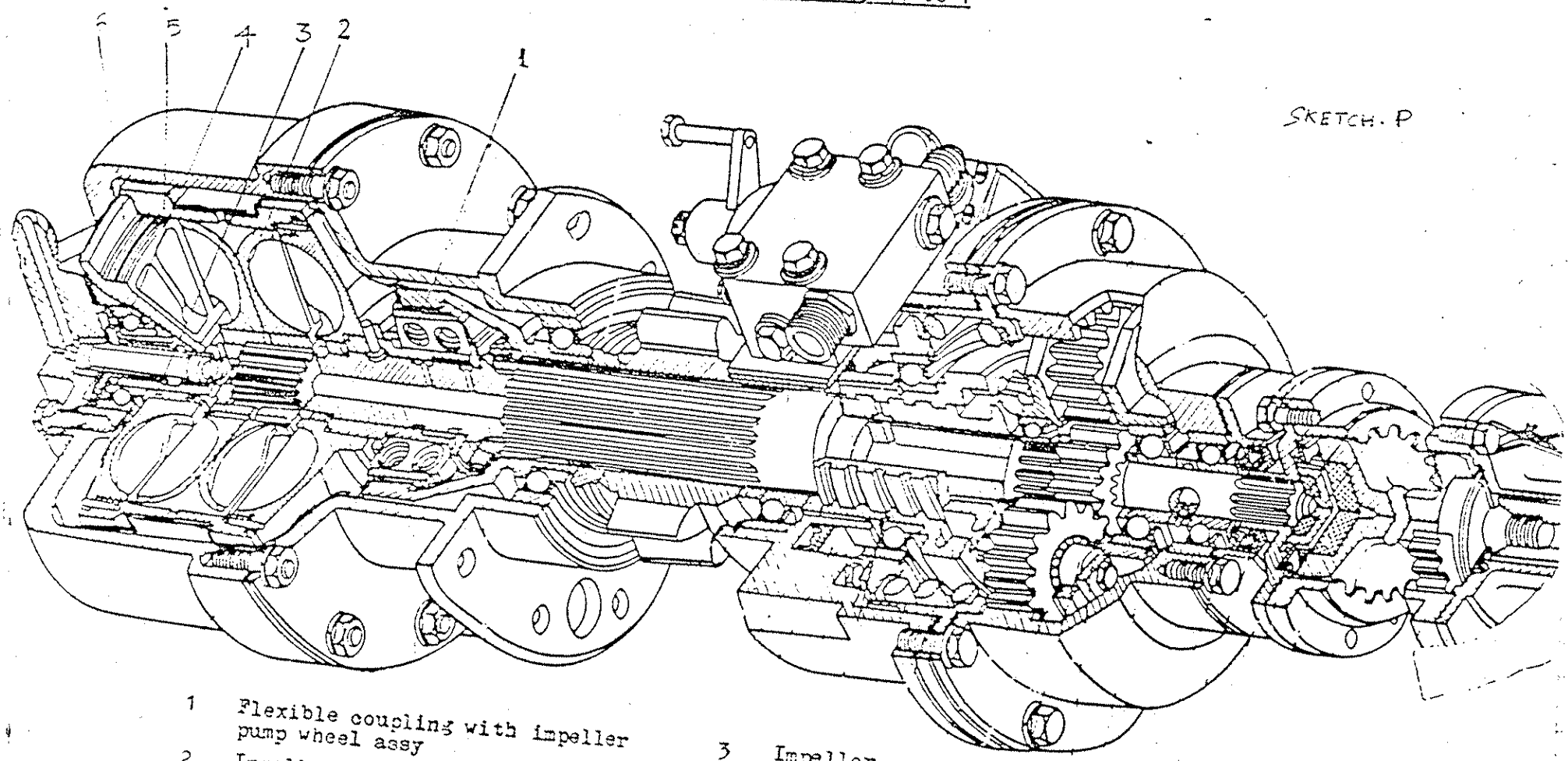
(b) The machined surfaces should be coated in the grease.

(c) The holes are to closed suitably to prevent entry of foreign matter.

PACKING

Assemblies/Components of the system should be packed suitably to protect the same from transit and handling damages.

STARTER GENERATOR DRIVE - 175-47 C8-1

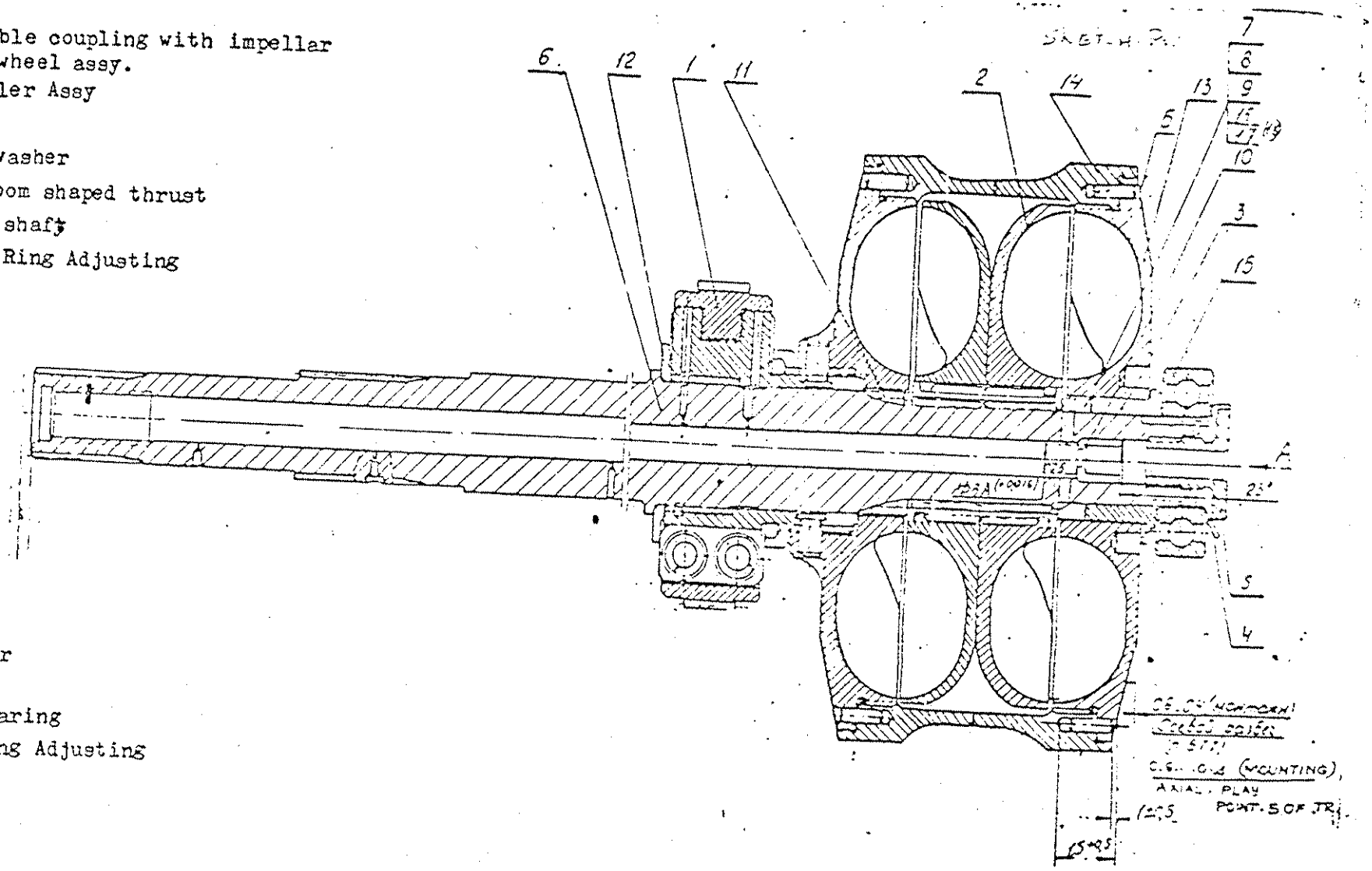


SKETCH. P

1 Flexible coupling with impeller pump wheel assy
2 Impeller Assy
3 Impeller
4 Ball bearing
5. Band
6. Impeller Driving

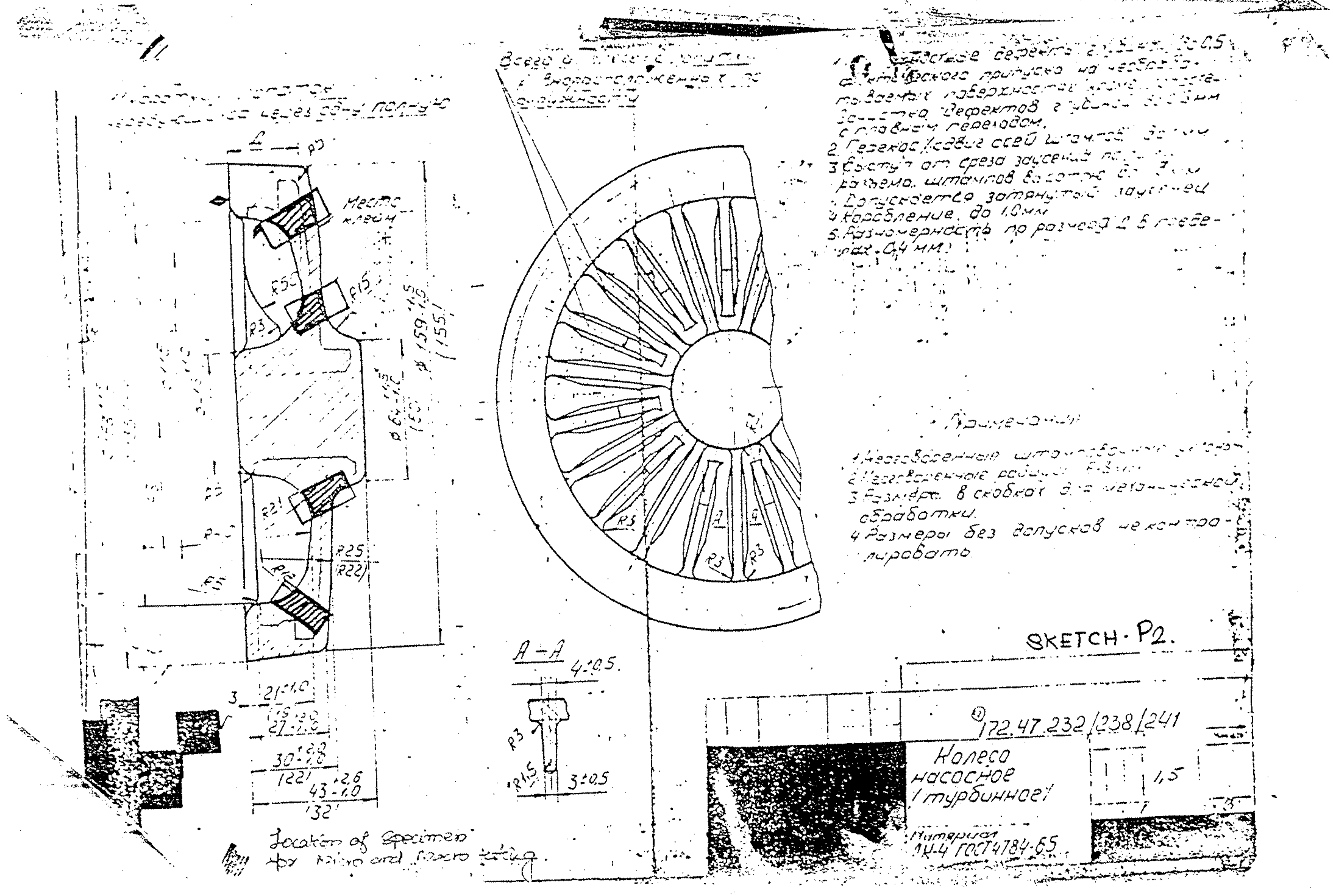
HYDRAULIC COUPLING WITH SHAFT ASSY

1 Flexible coupling with impellar pump wheel assy.
2 Impeller Assy
3 Bush
4 Lock washer
5 Mushroom shaped thrust
6 Drive shaft
7,8 & 9 Ring Adjusting
10 Bush
11 Ring



12 Washer
13 Impeller
14 Dowel
15 Ball Bearing
16 & 17 Ring Adjusting

16



Место клейм
R50
R15
R3
R21
R25
(R22)
ø 159 -1,5
(155)
21 -1,0
30
(22)
43 -1,0
(32)
Location of Specimen for Micro and Macro testing
A–A
4±0,5
3±0,5
R3
R1,5
1. Местные дефекты [illegible] 0,5 [illegible]
[illegible] припуска на чистовую [illegible]
[illegible] поверхностей [illegible]
[illegible] дефектов [illegible]
с плавным переходом.
2. Перекос/сдвиг осей [illegible]
3. Выступ от среза заусениц [illegible]
разъема, штампов [illegible]
Допускается затянутый заусенец
4. Коробление до 1,0 мм
5. Разномерность по размеру [illegible]
max. 0,4 мм.
Примечания
1. Неоговоренные штамповочные [illegible]
2. Неоговоренные радиусы [illegible]
3. Размеры в скобках для механической обработки.
4. Размеры без допусков не контролировать.
SKETCH · P2.
172.47.232/238/241
Колесо насосное /турбинное/
1,5
Материал АК-4 ГОСТ 4784-65