



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

Doc. No. : PRTD/AR/PF:03	Issue No. : 1	Issue Date : 28 Apr 2020	Report of Action Research
--------------------------	---------------	--------------------------	---------------------------

1.	Action Research Project No. <i>(as assigned by PRTD)</i>	AR/0084
2.	Title of the Action Research Project	<i>Designing of Automatic Cupel & Sample Feeder for Cupellation Furnace in RAL</i>
3.	Name & Designation of Officer	<i>Arvind Prakash Dhar Dwivedi, Scientist E & Head (SROL)</i>
4.	Deptt./BO/RO & Place of Posting	<i>Southern Regional Office Laboratory (SROL), Chennai</i>
5.	Date of Approval of the Project	<i>01 July 2020</i>
6.	Objective of the Project	<ol style="list-style-type: none"><i>To design equipment through which, Cupels & Samples can be fed in furnace with minimum human involvement.</i><i>To identify the suitable material of construction for Automatic feeder.</i>
7.	Report of Action Research Activities	<i>Attached</i>
8.	Conclusion & Recommendations	<ul style="list-style-type: none"><i>➤ The Automatic Cupel & Sample Feeder for Cupellation Furnace in RAL may be got fabricated by RAL of BIS as per the design/drawing given.</i><i>➤ This automatic feeder would ensure safety of testing personnel.</i><i>➤ It may also enhance output in terms of number of samples tested.</i>
9.	Any other relevant information	<i>No</i>

(A.P.D. Dwivedi)
Sc. E & Head (SROL)

Sc. G & DDG (Labs)

Sc. G & DDG (PRT)

TABLE OF CONTENTS WITH LIST OF FIGURES AND TABLES

1	Introduction	4-8
	Figure 1 : Magnesita Cupels	6
	Figure 2 : Feeding of Cupels in Cupellation Furnace	6
	Figure 3 : Pre-heating of Cuples in Cupellation Furnace	7
	Figure 4 : Assay and the Proof Assay samples for feeding in to Cupellation furnace	7
	Figure 5 : Assay and the Proof Assay samples feeding in Cupellation furnace	7
	Figure 6 : Completion of Cupellation process	8
2	Review of Literature	9
3	Methods & Materials, Data, Details of Field Visits for studies & research etc.	10-15
	Figure 7: Feeder for simultaneous feeding of 12 Assay and the Proof Assay samples	10
	Figure 8 : Big feeder	11
	Figure 9 : Big Cupel	11
	Figure 10 : Cupel Tray	12
	Figure 11 : Feeder with 48 slots	13
	Figure 12 : Various Feeding Mechanism	15
4	Results & Analysis	16-61
	Figure 13 : Cuples 8 Nos layout	17
	Table 1: Details of the component	18

2-D drawings of different components along with dimensions of the Automatic Cupel and sample feeder	19-55
3-D drawings of the Mechanism	56-60
5 Summary and Conclusions	62-64
6 Recommendations	65
7 Details of the BIS support availed with justification, bills/vouchers, etc., as relevant	66
8 DECLARATION OF ORIGINAL WORK	67

1. INTRODUCTION

Bureau of Indian Standards is operating Hallmarking scheme in which Registration is granted to the jewellers by BIS under Hallmarking Scheme. The BIS certified jewellers can get their jewellery hallmarked from any of the BIS recognized Assaying and Hallmarking Centres.

Samples of Hallmarked Gold Jewellries drawn by Conformity Assessment Department of BIS is tested in Referral Assay Laboratories of BIS.

Various steps involved in testing of Gold samples as per IS 1417:2016 & IS 1418:2009 are as follows:

1. Checking of purity through XRF-Spectrophotometer
2. Fire assay consisting of :
 - (i) Cupellation
 - (ii) Annealing
 - (iii) Parting

Out of above three processes mentioned at Sr. No. 2, **Cupellation**, is the most important and critical process and requires adequate control and proper safety during feeding of cuples and Assay samples into cupellation furnace as temperature of cupellation furnace is maintained at around 1100 °C.

The process of cupellation involves following steps:

- (i) Maintaining of Cupellation furnace at 1100 °C (**Figure-1**).
- (ii) Placing Magnesia Cuples into Cupellation furnace manually with help of tongue. Four cupels are placed one by one and adjusted in the furnace so that there is no gap between four cuples (**Figure-2**).
- (iii) Preheating of cuples to at least 1100 °C (**Figure-3**)
- (iv) All the four cuples are having six cavities so that total 24 cavities are available for placing samples. Each sample (Assay sample) is tested in duplicate (10 x 2) and 4 proof assay samples of proof gold are also placed in the cuples (**Figure-4**). So total 10 samples can be tested at a time at present.

- (v) Placing the Assay and the Proof Assay samples one by one, in cavities in Magnesite cupels which have been preheated to 1100°C in the cupellation furnace **(Figure-5)**.
- (vi) Continue heating at cupellation furnace maintained at 1050 °C – 1100 °C, until this stage is completed (about 25 min) under oxidizing conditions.
- (vii) Removing the cupels from the furnace in the same manner in which it was placed in the furnace. Allowing the precious metal buttons to cool down before lifting them from the cupels with the assay pliers.

From the above process, it may be seen that testing personnel are exposed to high temperature of 1050 °C – 1100 °C and also cupels & Assay samples are placed manually in the furnace with the help of tongue.

Placing Cupels, Assay and the Proof Assay samples requires some time, and during this period the testing personnel are exposed to high temperature and toxic fumes coming out of the cupellation furnace.

This also limits the number of cupels which can be placed in to the cupellation furnace as for placing more number of samples (more than four cupels), more time is required and it results in considerable drop of temperature. As per the present practice maximum 10 samples are tested at a time by placing four cupels in the cupellation furnace.

Therefore, a mechanism with automatic feeding of all cupels at a time and simultaneous placing of all Assay and the Proof Assay samples will considerably reduce duration of exposure of testing personnel to high temperature and toxic fumes. Also, with the provision of placing all Assay and the Proof Assay samples simultaneously, more number of cupels and consequently more number of samples can be placed in the cupellation furnace in short time without considerable drop in temperature, as door of the furnace will be open for short duration.

With automatic feeding arrangement, there will be following three major advantages:

- (i) Safety of testing personnel;
- (ii) Ease of operation;
- (iii) Enhanced testing capacity.

With above objective, equipment **“Automatic Cupel & Sample Feeder for Cupellation Furnace in RAL”** has been designed. While designing the equipment, it has also been considered to select suitable material which can withstand the required temperature and easy for welding.

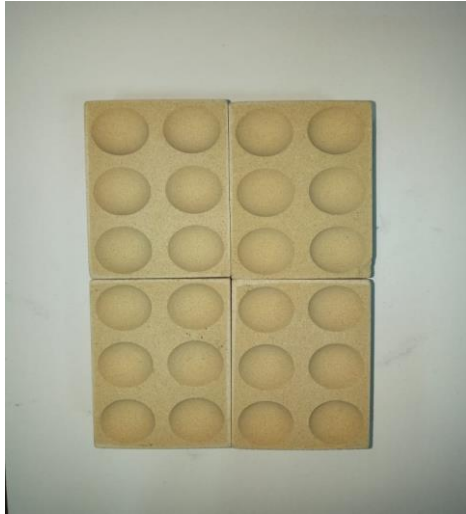


Figure 1: Magnesia Cupels

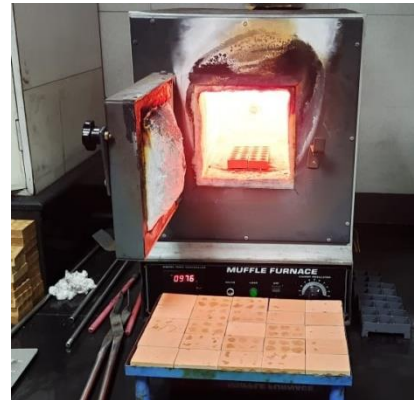


Figure 2: Feeding of Cupels in Cupellation Furnace



Figure 3: Pre-heating of Cuples in Cupellation Furnace



Figure 4: Assay and the Proof Assay samples for feeding in to Cupellation furnace



Figure 5: Assay and the Proof Assay samples feeding in Cupellation furnace



Figure 6: Completion of Cupellation process

2. REVIEW OF LITERATURE (BACKGROUND RESEARCH/LITERATURE SURVEY/ANY OTHER MEANS ETC)

For designing the equipment, the process of testing prescribed in following Indian Standards has been referred:

- IS 1417:2016 (Gold and gold alloys, jewellery/artefacts - Fineness and marking)
- IS 1418:2009 (Determination of Gold in Gold Bullion, Gold Alloys and Gold Jewellery/Artifacts Cupellation (Fire Assay) Method) has been referred.

For deciding the suitable material for construction of the feeding mechanism, various articles available on internet has been referred.

3. METHODS & MATERIALS, DATA, DETAILS OF FIELD VISITS FOR STUDIES & RESEARCH ETC.

As an Auditor for Assaying and Hallmarking, approximately 15 hallmarking centres have already been visited and testing witnessed.

During the visits to BIS Central Laboratory testing procedure adopted by Central Laboratory has been observed.

SROL is having, Referral Assay Laboratory and engaged in regular testing of Gold samples. Detailed discussion has been held with testing personnel regarding various aspects of testing.

Witnessing of testing on various occasions and discussion held with testing personnel enabled to understand the difficulties faced by the testing personnel during cupellation process and to find suitable method to reduce the hazard to which testing personnel are exposed and also to find ways to explore the possibility to enhance the testing capacity.

Earlier trials were made by RAL, SROL utilizing feeder for simultaneous feeding of 12 Assay and the Proof Assay samples (**Figure 7**).

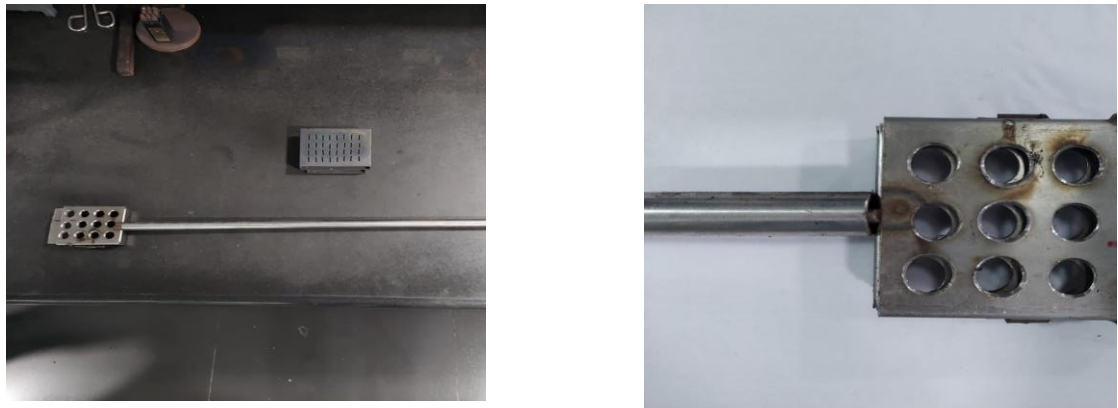


Figure 7: Feeder for simultaneous feeding of 12 Assay and the Proof Assay samples

Also, big feeders are also available for simultaneous feeding of multiple samples. Please see **Figure 8**.



Figure 8: Big feeder

During, this project effort was made to use big cuples in place of small cuples so that one cupel can be used in place of four cuples (**Figure 9**). But handling big cuples with tongs was found difficult especially at the time of removing it from heated furnace.



Figure 9: Big Cupel

Also to keep cuples in compact form, tray was used (**Figure 10**).

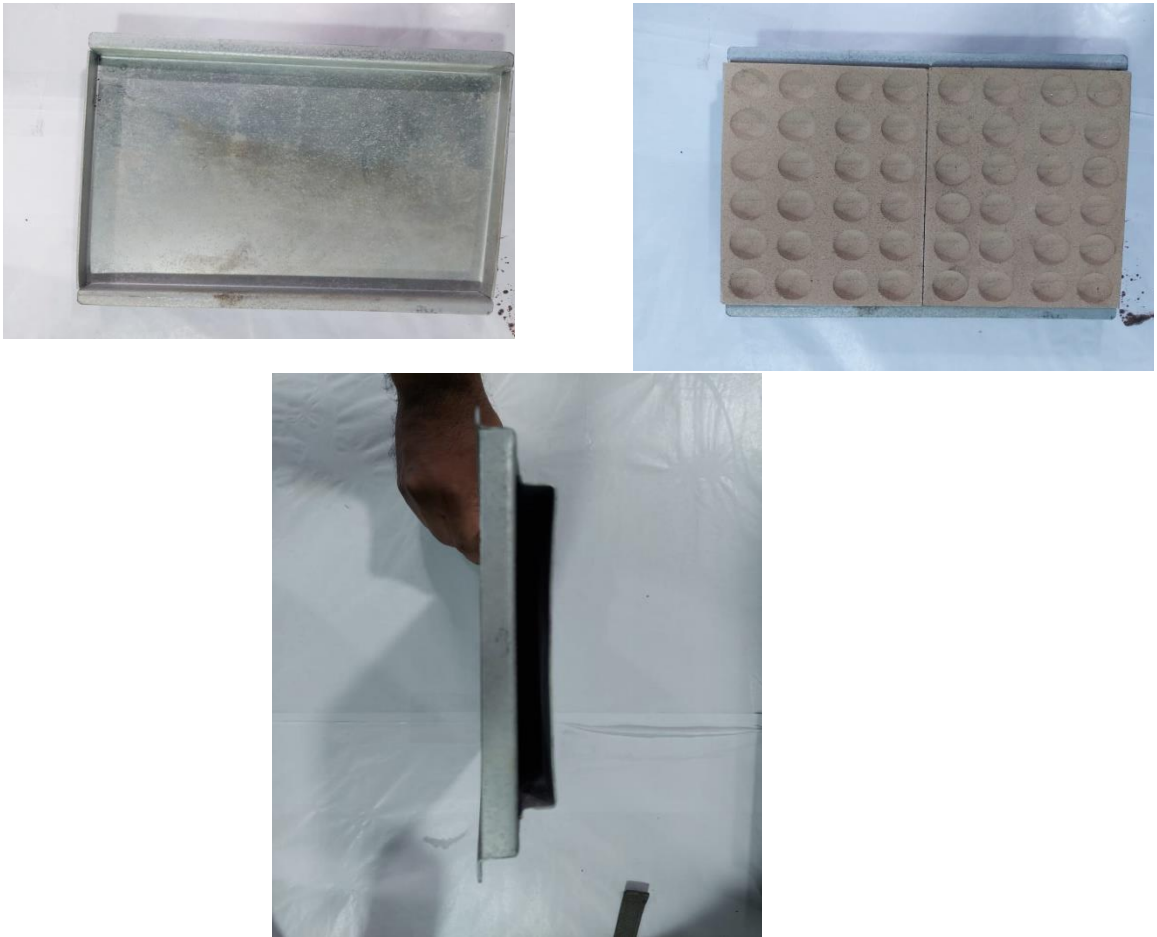


Figure 10 : Cupel Tray

Also, to avoid rolling out of Assay and the Proof Assay samples, which are in ball shape from available feeders, different design of feeder with 48 slots was tried (**Figure 11**).

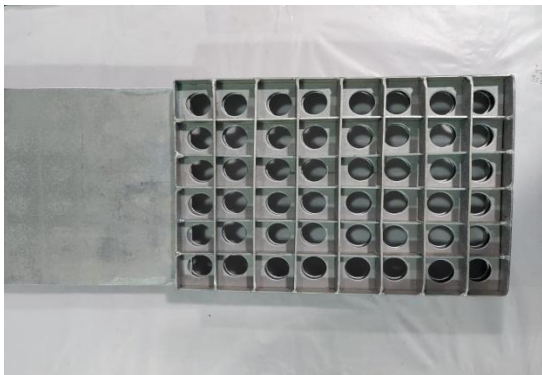
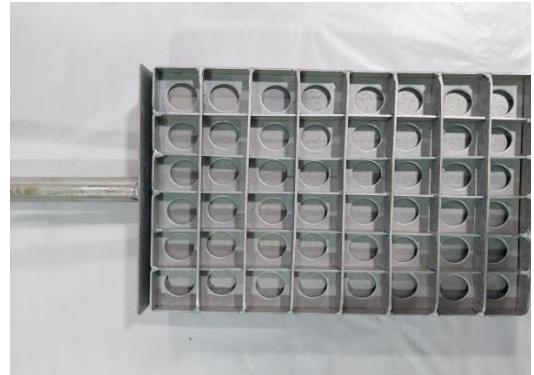


Figure 11 : Feeder with 48 slots

Constraints/Challenges observed during these trials:

(i) With feeder of 12 holes/cavity

- Aligning Sample feeder holes with cupels cavity, while cupels are placed in Furnace at elevated temperature at around 1100 °C.
- Manually feeding and aligning is not possible
 - 4 Cuples cannot be placed in compact manner
 - Furnace at high temperature
 - Low visibility
 - Considerable drop in furnace temperature
 - Rolling out of sample balls from the feeder

(ii) With feeder of 48 holes/cavity

- Aligning Sample feeder holes with cupels cavity, while cupels are placed in Furnace at elevated temperature at around 1100 °C.
- Manually feeding and aligning is not possible
 - Feeder is heavy
 - Furnace at high temperature
 - Low visibility

Therefore it was felt that for feeding of cupels and samples, some ***Mechanical Mechanism*** is needed for perfect alignment.

Various mechanisms being used for feeding cuples were searched in internet and few are given at **Figure 12**.

Based on the above, the equipment has been designed.



Figure 12 : Various Feeding Mechanism

4. RESULTS & ANALYSIS

4.1 AIM of the ARP

The aim of the Action Research Project is to address following issues:

- (i) Manual feeding of cupels with tongue, one by one in to the cupellation furnace maintained at around 1100 °C
- (ii) Manual feeding of Assay and the Proof Assay samples one by one in to Cupellation furnace maintained at around 1100 °C
- (iii) Limitation of number of cuples which can be placed in to the cupellation furnace as for placing more number of cuples (more than four cuples) and subsequently more number of samples, more time is required and it results in considerable drop of temperature and thus adversely affecting the result.

During the process (i) & (ii), testing personnel are exposed to high temperature and toxic fumes for long duration.

4.2 Analysis

The exposure time can be reduced by following means:

- (i) Providing Automatic mechanism for simultaneous feeding of all cuples in the furnace in one go.
- (ii) Providing Automatic mechanism for simultaneous feeding of all Assay and the Proof Assay samples in to Cupellation furnace in one go.

The above two arrangement will reduce the time duration for which furnace door is open thereby considerably reducing the duration of exposure and also reduce the temperature drop of the furnace. With automatic feeding mechanism since time duration of opening of furnace door is less, more number of cuples can be placed in the furnace and consequently more samples may be tested at a time.

Considering the size of the existing cupellation furnace, 8 cuples can be accommodated in the furnace. These 8 cuples will have total 48 cavities in which 20 samples in duplicate

(20 x 2) and 8 Proof Assay samples may be placed. Thus total 20 samples may be tested at a time instead of 10 samples as being tested presently (**Figure 13**).

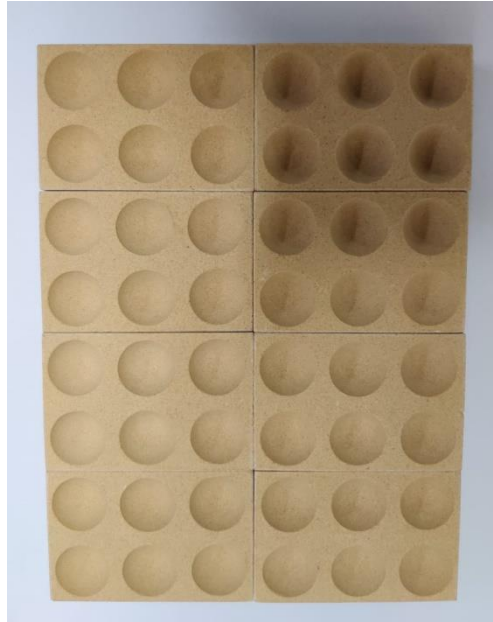


Figure 13: Cuples 8 Nos layout

4.3 Design of the equipment

Details of the component are placed at Table 1, Page 18.

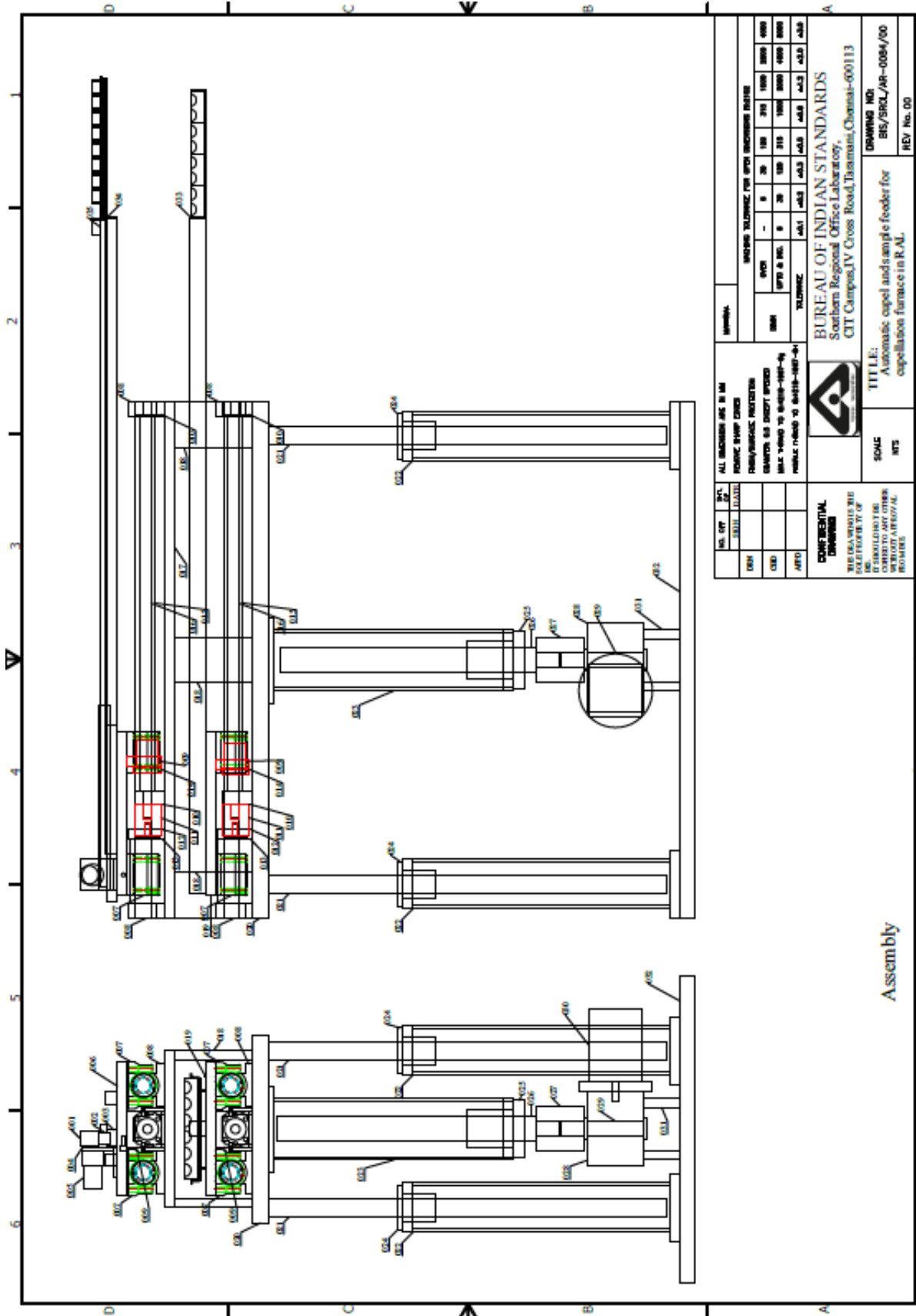
Two-dimensional drawing of different components along with dimensions of the Automatic Cupel and sample feeder are given at **Page 19 to 55**.

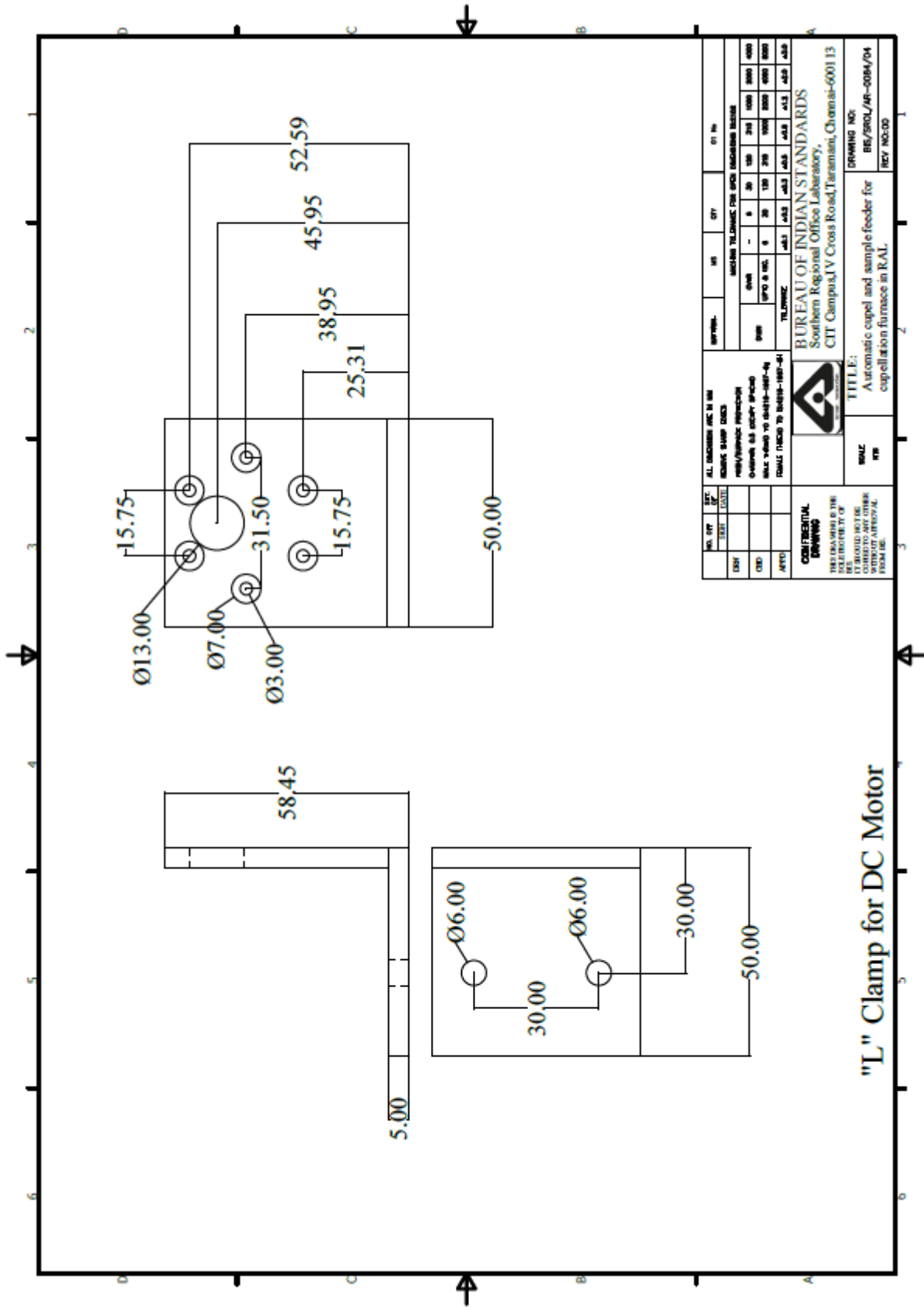
Three Dimensional Drawings of the mechanism is given at **Page 56 to 60**.

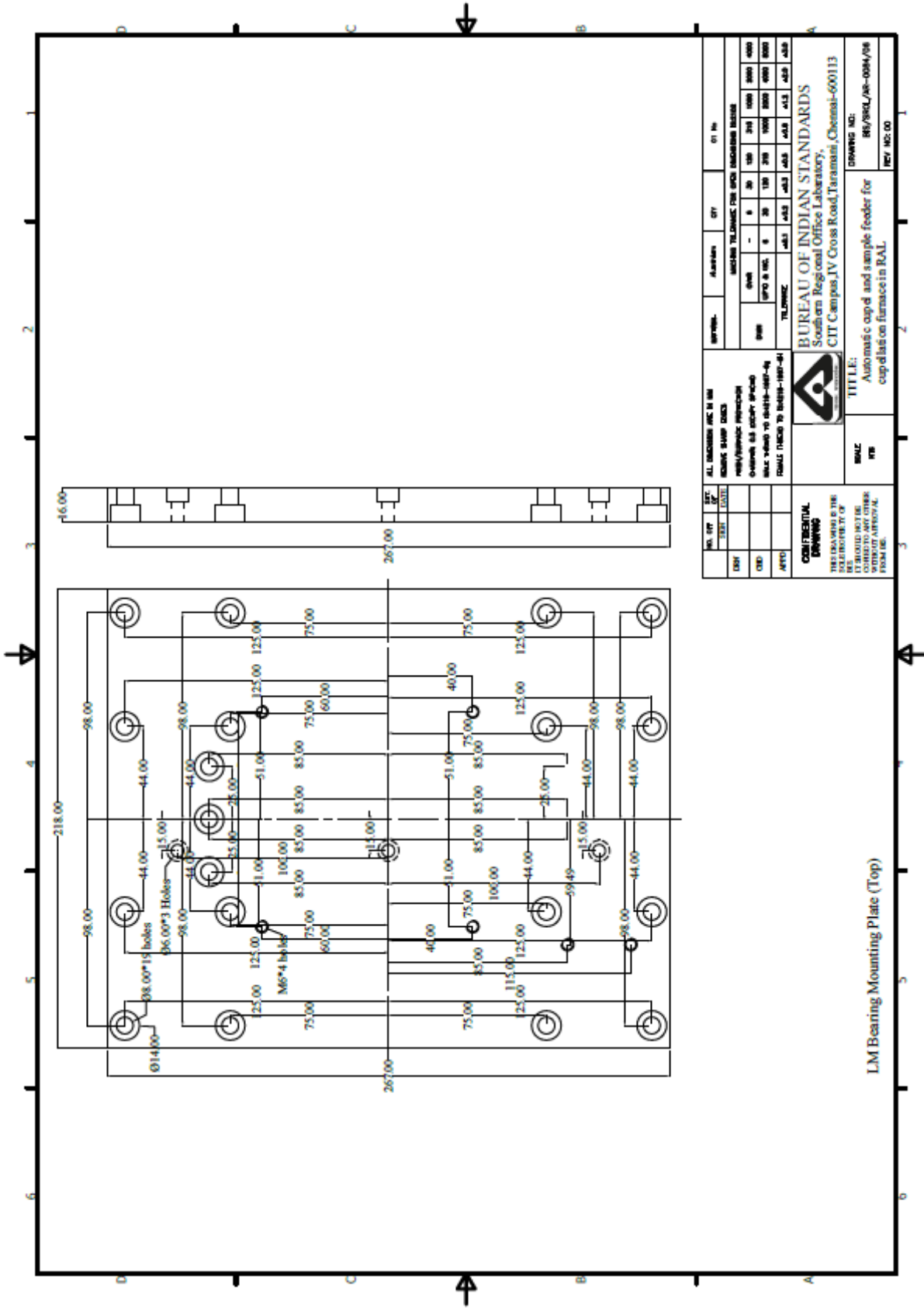
AUTOMATIC CUPEL AND SAMPLE FEEDER FOR CUPELLATION FURNACE IN RAL

Drawing No	Description	Material / Model	Qty in Number
BIS/SROL/AR-0084/00	Assembly		
BIS/SROL/AR-0084/01	Spur Gear	EN353	1
BIS/SROL/AR-0084/02	Rack	EN353	1
BIS/SROL/AR-0084/03	Rack Support Plate	MS	1
BIS/SROL/AR-0084/04	"L" Clamp for DC Motor	MS	1
BIS/SROL/AR-0084/05	DC Gear Motor	24V DC	1
BIS/SROL/AR-0084/06	LM Bearing Mounting Plate(Top)	Aluminium	1
BIS/SROL/AR-0084/07	LM Bearing	SC25UU	8
BIS/SROL/AR-0084/08	LM Shaft End Support	SK-25	8
BIS/SROL/AR-0084/09	Ball Screw Nut Housing	Aluminium	2
BIS/SROL/AR-0084/10	Ball Screw End Support	BF 15	4
BIS/SROL/AR-0084/11	Zero Backlash Oldham coupling	SOH - 43C	2
BIS/SROL/AR-0084/12	Stepper Motor Mounting Plate	Aluminium	2
BIS/SROL/AR-0084/13	Hybrid Stepper Motor	PSM57HS2A106-2P	2
BIS/SROL/AR-0084/14	Ball Screw Nut	FSU 2005-4	2
BIS/SROL/AR-0084/15	Ball Screw	FSU 2005-4	2
BIS/SROL/AR-0084/16	LM Shaft - 25 ϕ	SUJ2	4
BIS/SROL/AR-0084/17	Base Plate - 1	Aluminium	1
BIS/SROL/AR-0084/18	Vertical Plate	Aluminium	6
BIS/SROL/AR-0084/19	LM Bearing Mounting Plate(Bottom)	Aluminium	1
BIS/SROL/AR-0084/20	Base Plate - 2	Aluminium	1
BIS/SROL/AR-0084/21	LM Shaft - 30 ϕ	SUJ2	4
BIS/SROL/AR-0084/22	Sleeve	MS	4
BIS/SROL/AR-0084/23	Center Sleeve	MS	1
BIS/SROL/AR-0084/24	LM Bearing	LMF30UU	4
BIS/SROL/AR-0084/25	Ball screw Nut	FSU 4010-4	1
BIS/SROL/AR-0084/26	Ball screw	FSU 4010-4	1
BIS/SROL/AR-0084/27	Zero Backlash Oldham coupling	SOH-70C	1
BIS/SROL/AR-0084/28	Gear Box	TW50 80 B5	1
BIS/SROL/AR-0084/29	Center Shaft	MS	1
BIS/SROL/AR-0084/30	2 phase hybrid step motor	PSM86HS2A118-2P	1
BIS/SROL/AR-0084/31	Gear Box Base	MS	1
BIS/SROL/AR-0084/32	Base Plate (Bottom)	MS	1
BIS/SROL/AR-0084/33	Bottom Tray	Alloy C 276	1
BIS/SROL/AR-0084/34	Material Loading Tray	Alloy C 276	1
BIS/SROL/AR-0084/35	Material Holding Plate	Alloy C 276	1
BIS/SROL/AR-0084/36	Bottom Tray Loader	Alloy C 276	1

Table 1: Details of the component

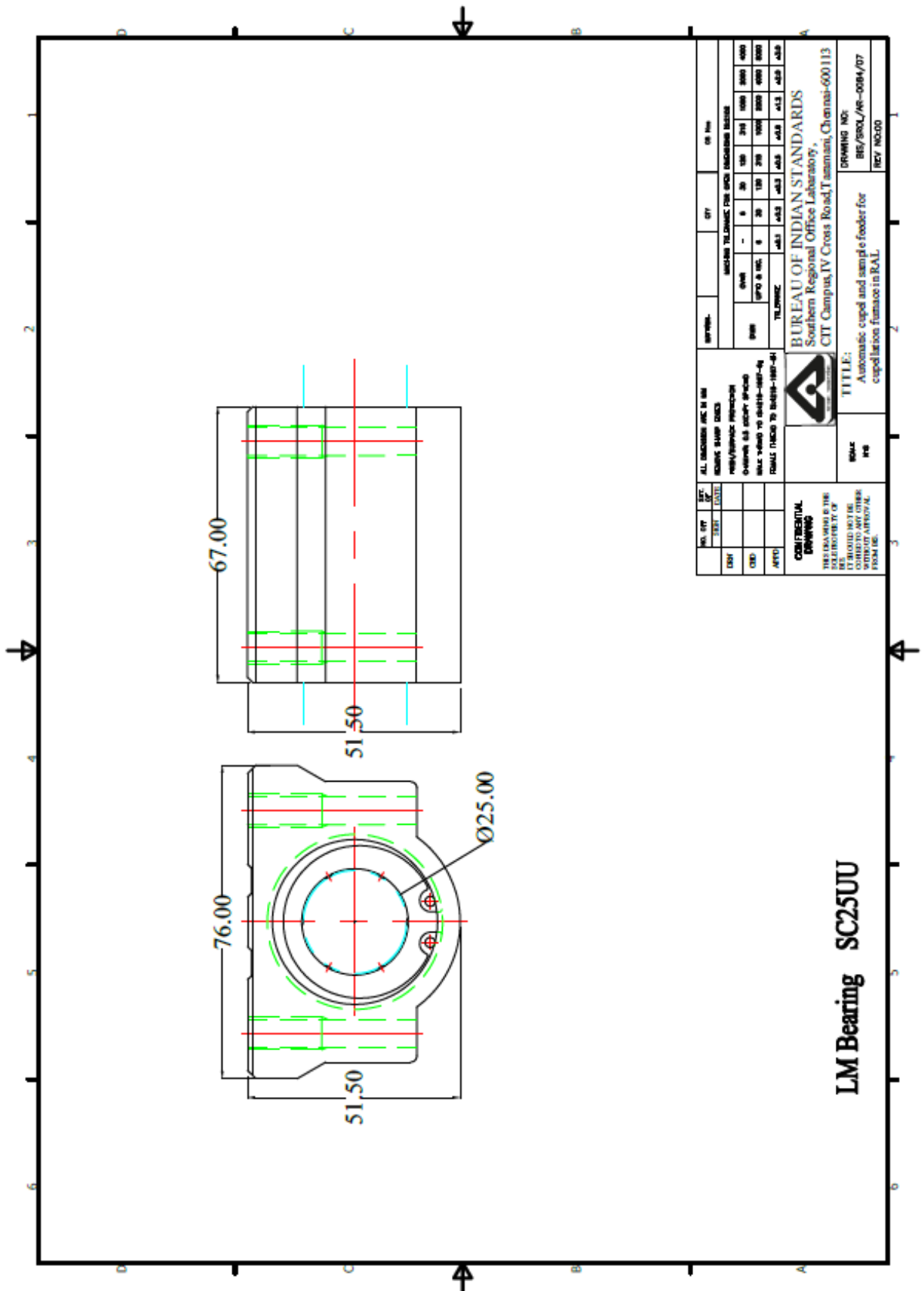






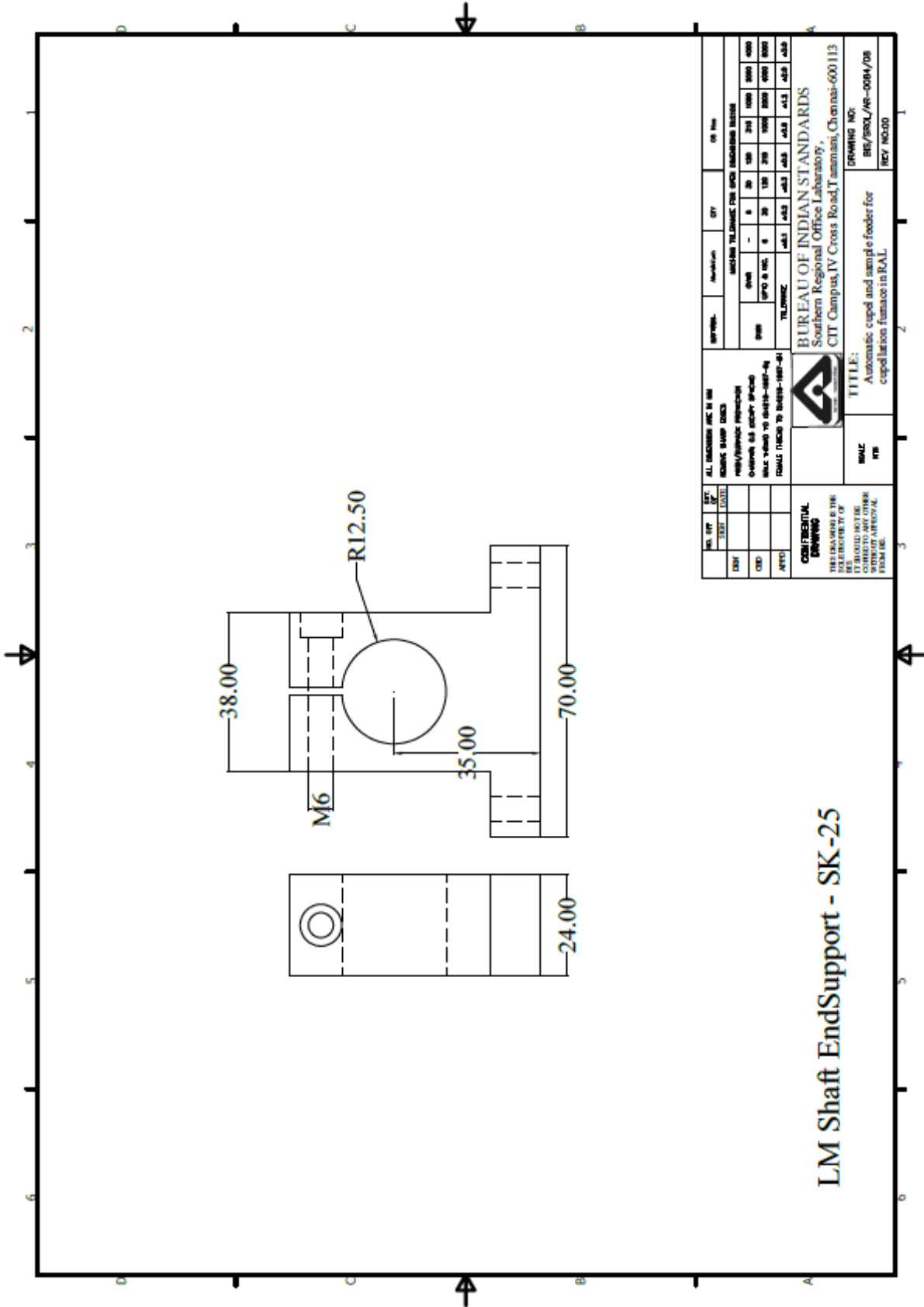
LM Bearing Mounting Plate (Top)

NO. OF TEST	DATE	BY	APPROVED	DATE
ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE DIMENSIONS ARE TO BE TAKEN FROM THE CENTER OF THE HOLES UNLESS OTHERWISE SPECIFIED.		REVISIONS NO. DATE DESCRIPTION 01 10/10/2018 INITIAL DESIGN		
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF THE BUREAU OF INDIAN STANDARDS. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE BUREAU OF INDIAN STANDARDS.		BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600113		
TITLE: Automatic cupid and sample feeder for cupulias on furnace in RAL		DRAWING NO.: BS/SRL/AR-0284/08		
		REV NO: 00		




NO. OF SHEETS	REV. OF SHEET	ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE	DATE	BY	CHKD.	APPD.	SCALE	TITLE	DRIVING NO.
1	1	REFER TO DRAWING FOR DIMENSIONS					1:1	Automatic cup and sample feeder for cupped larvae furaxae in RAL	BSE/RSOL/RS-0084/07
BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600113			TEL: 044-26361001 FAX: 044-26361002 E-MAIL: bisi@bisi.gov.in						
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF BSI. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT PERMISSION FROM BSI.			REV. NO. 00 REV. DATE 01/01/2007						

LM Bearing SC25UU

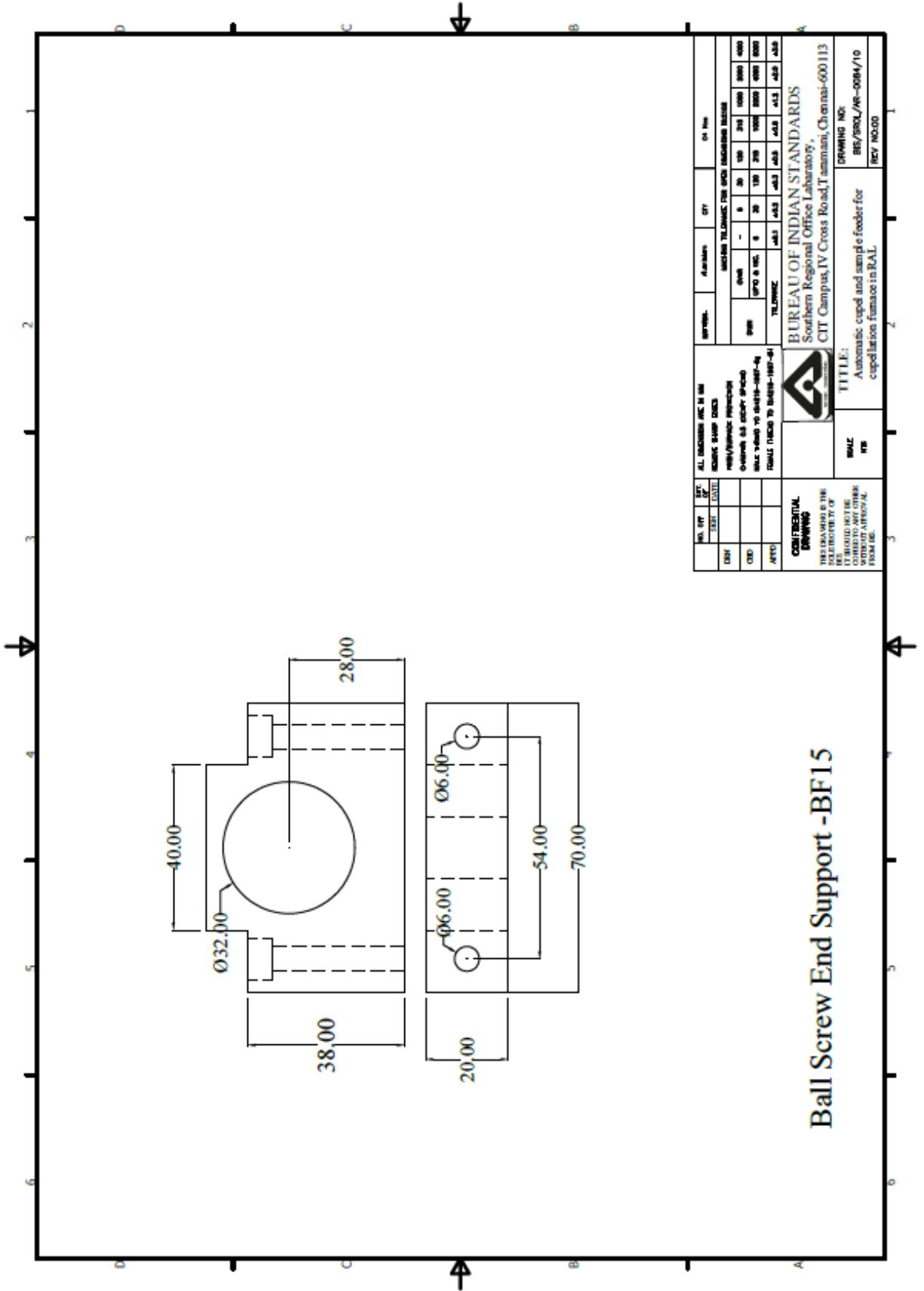


LM Shaft EndSupport - SK-25

REV	DATE	BY	CHKD	APP'D	MATERIAL	QTY	REVISION	DIMENSIONS	
								MIN	MAX
								1	1
								2	2
								3	3

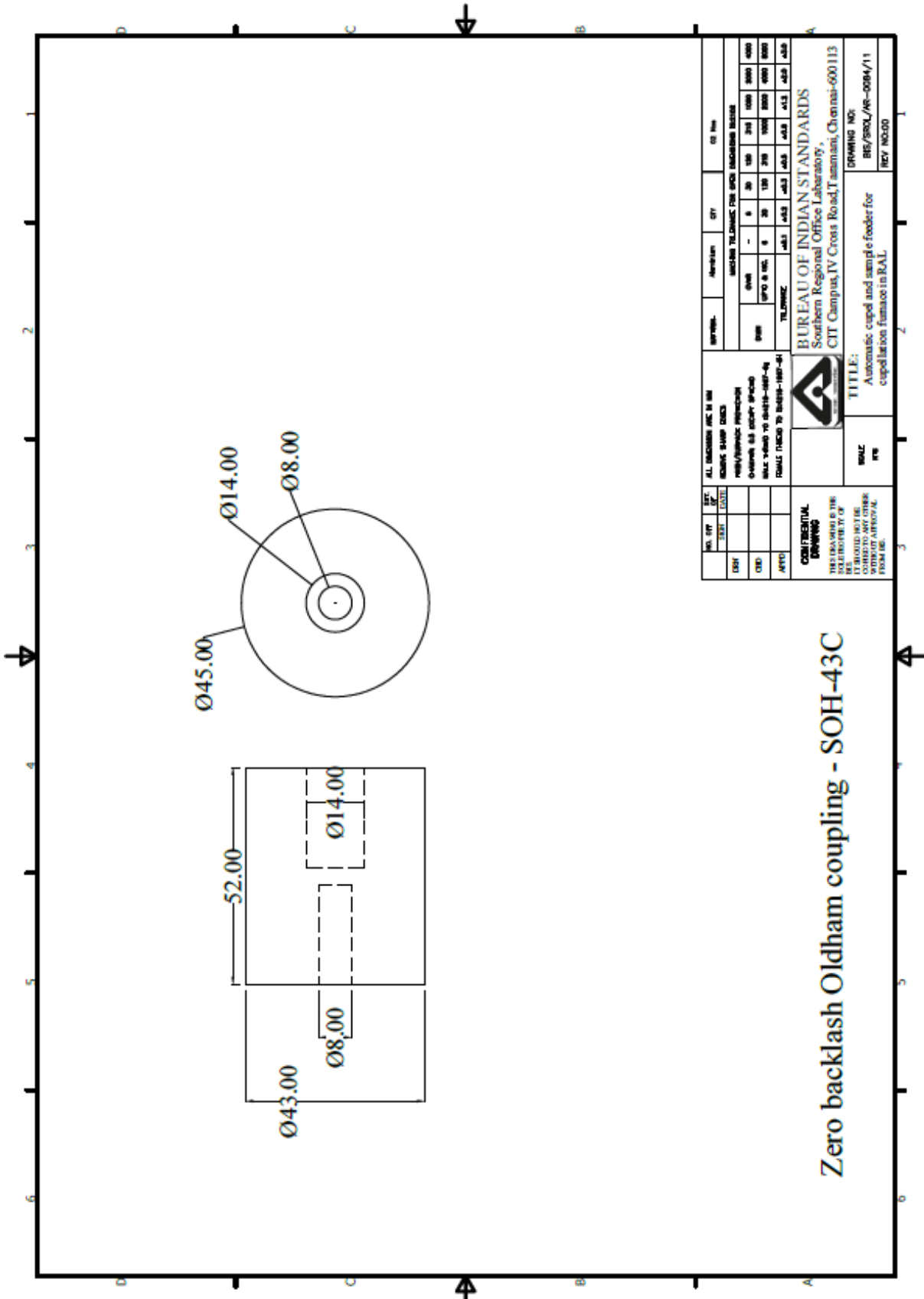
ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	 <p>BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, T.aramani, Chennai-600 113</p>	TITLE: Automatic cup and sample feeder for capitulation furnace in BAL.
<p>THIS DRAWING IS THE SOLE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT IS TO BE USED ONLY FOR THE PURPOSE FOR WHICH IT WAS DRAWN. IT IS NOT TO BE REPRODUCED OR COPIED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF THE BUREAU OF INDIAN STANDARDS.</p>		

<p>DRIVING NO: BIS/SRO/LAK-0084/08</p>
--




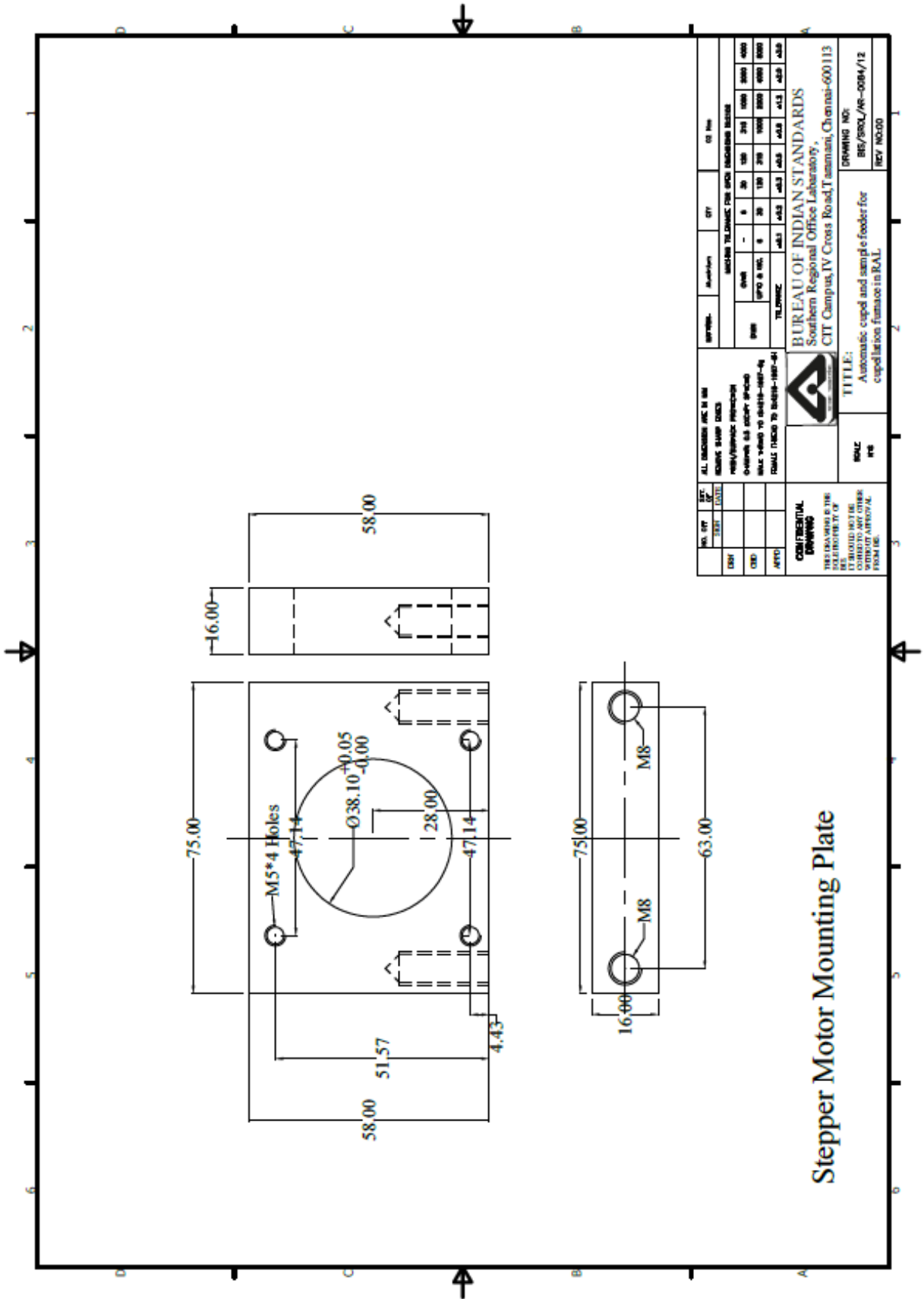
Ball Screw End Support -BF15

NO. OF SHEET	SFT. TOTAL	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	SHEET	REV.	DATE	BY	CHKD.	APP'D.	MATERIAL	QUANTITY	CITY	ON FILE	INDIAN TELEPHONE FOR SPOKE INDUSTRIES BANGALORE											
													SPOKE				SPOKE				SPOKE			
BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tammamani, Chennai-600113													DRAWING NO:											
CONFIDENTIAL DRAWING THIS DRAWING IS THE SOLE PROPERTY OF THE BUREAU OF INDIAN STANDARDS AND IS NOT TO BE LOANED, REPRODUCED OR COPIED IN ANY MANNER WITHOUT APPROVAL FROM B.I.S.													BIS/SRO/WR-0084/10 REV 00/00											
TITLE: Automatic cup and sample feeder for copulation frame in RAL.													REV 00/00											



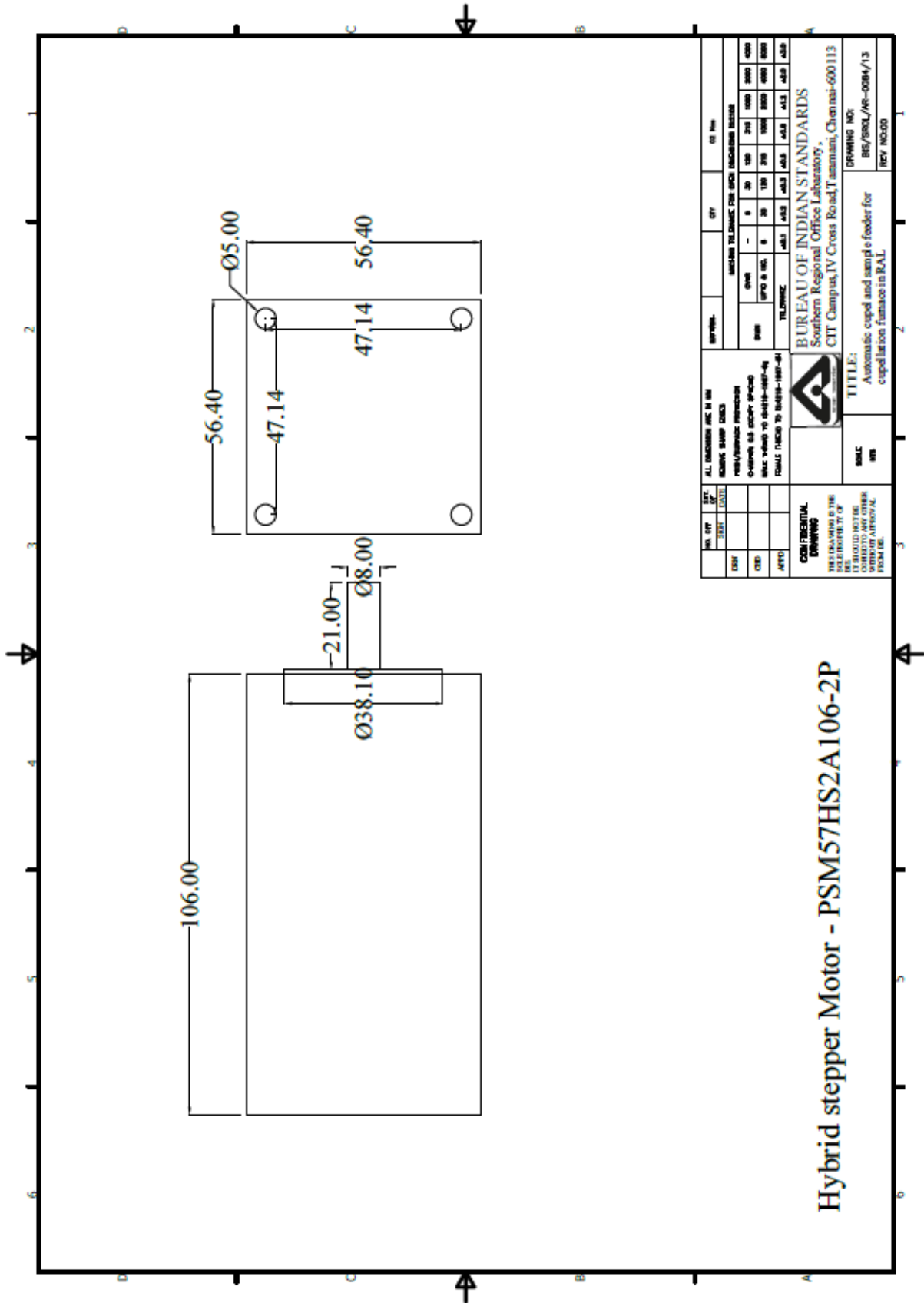
Zero backlash Oldham coupling - SOH-43C

NO. OF SHEET	REV. LOCUS	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	SYMBOL	NUMBER	QTY	CS No.
001		ISO/ANSI SYMBOLS UNLESS SHOWN OTHERWISE				
002		CHARACTERISTICS OF MATERIALS UNLESS SHOWN OTHERWISE				
003		FORMS TO BE USED TO DRAWING-1001-01				
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF THE COMPANY AND IS TO BE KEPT SECRET AND NOT TO BE REPRODUCED OR USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN APPROVAL FROM THE COMPANY.		 BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tammassu, Chennai-600113	TITLE: Automatic cap and sample feeder for capillary furnace in RAL		DRAWING NO: BS/SRO/L/AR-0084/11 REV 00/00	



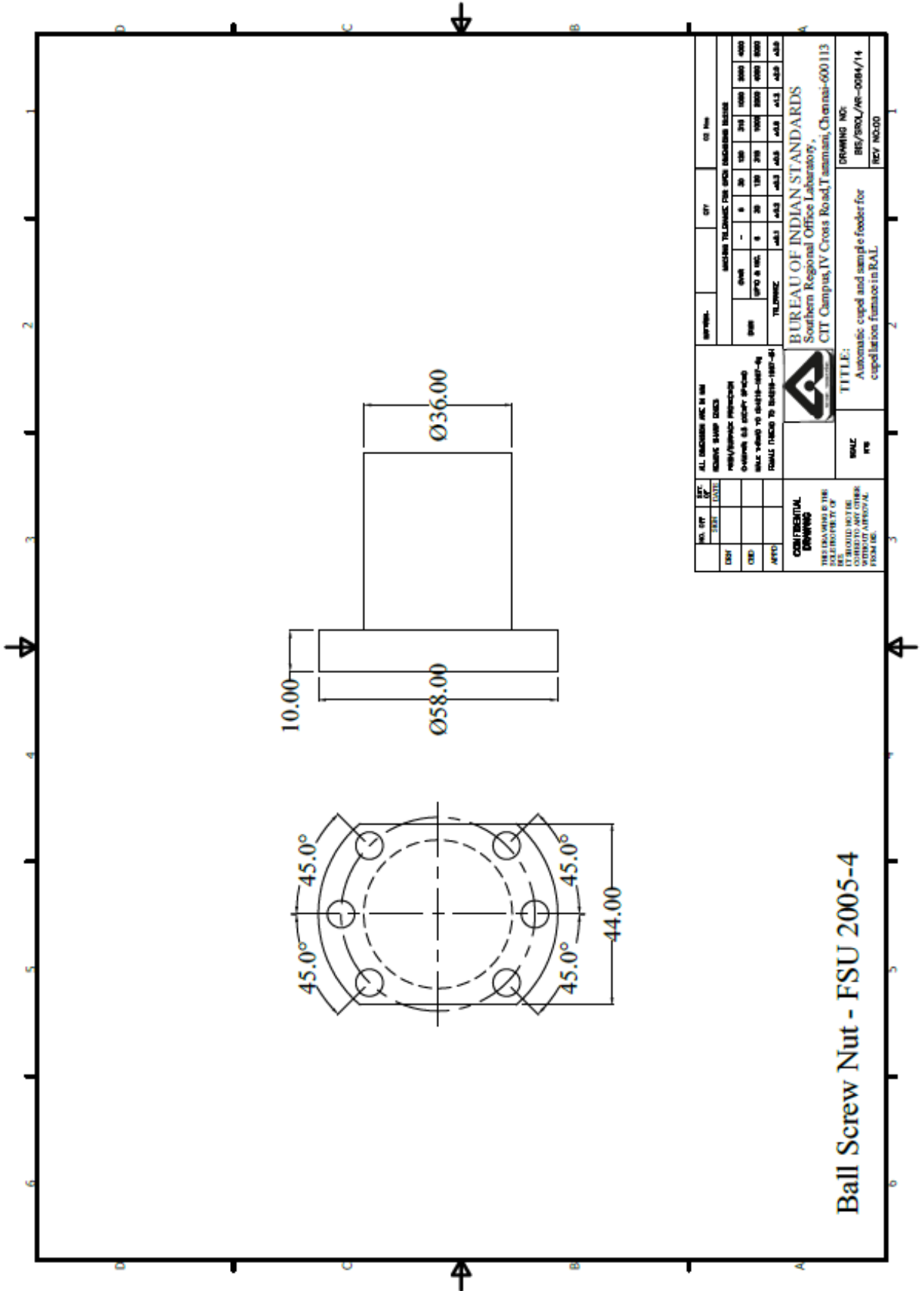
Stepper Motor Mounting Plate

NO. OF SHEETS	1	OF	1	ALL DIMENSIONS ARE IN MM UNLESS STATED OTHERWISE	DATE	10/01/2012
DESIGN		CHKD		DESIGNED BY: S. S. SURESH	DATE	10/01/2012
CHKD		APPD		CHKD BY: S. S. SURESH	DATE	10/01/2012
APPD				APPD BY: S. S. SURESH	DATE	10/01/2012
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF BIS. IT SHOULD NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT APPROVAL FROM BIS.		BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600113		TITLE: Automatic cup and sample feeder for cupped lagoon furnace in RAL.		
ALL DIMENSIONS ARE IN MM UNLESS STATED OTHERWISE FINISH: RAUGE SURFACE TREATMENT: GALVANNEAL TOLERANCE TO DIMENSIONS: ±0.10		QUANTITY: 1000 MATERIAL: SS 304		DRAWING NO: BIS/ROSL/AR-0084/12 REV. NO: 00		



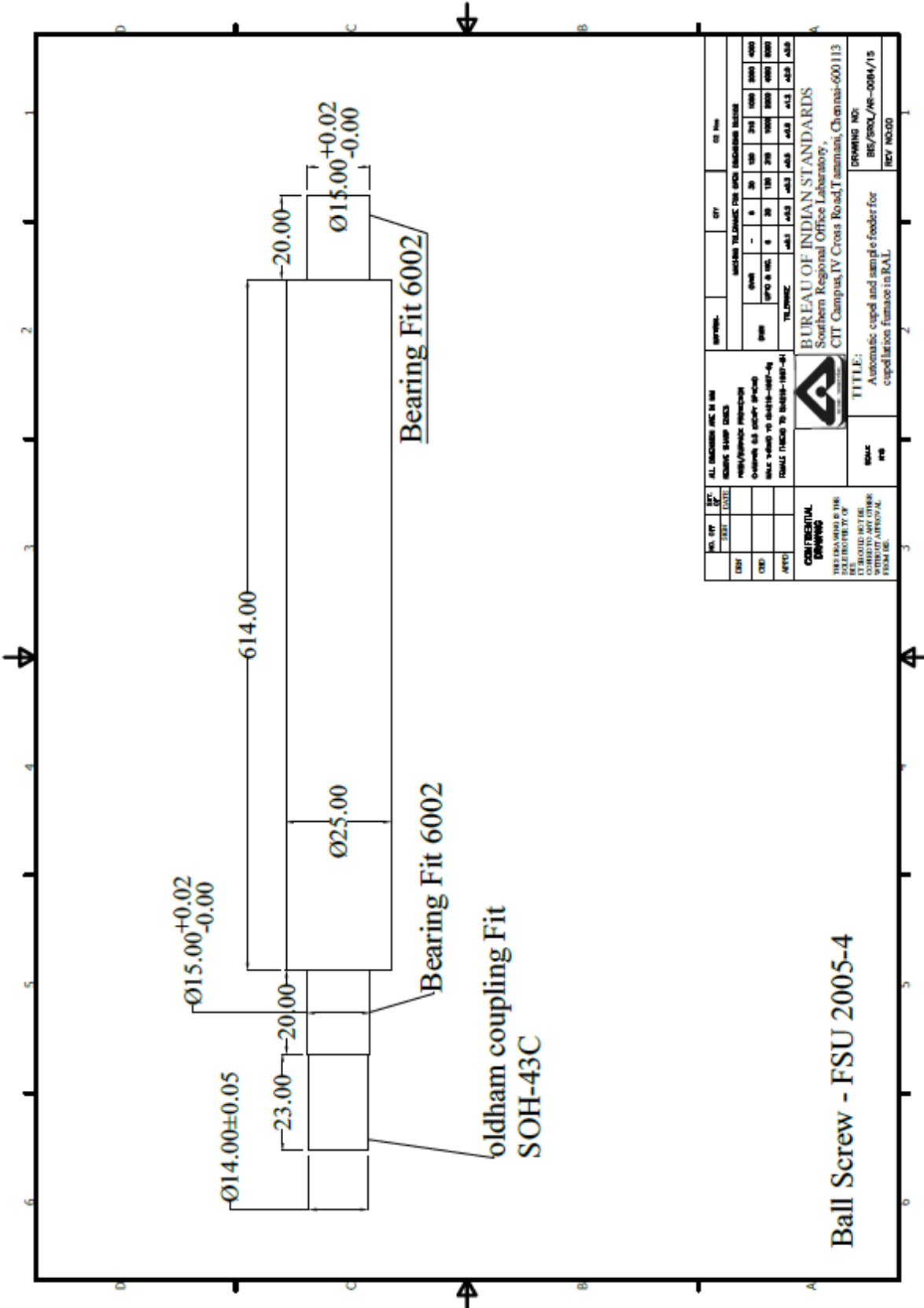
Hybrid stepper Motor - PSM57HS2A106-2P

NO. OF TEST	SIZE	UNIT	ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE	SYMBOLS	UNIT	UNIT
ESD			ISO 2768-M			
CD			ISO 2768-M			
APT			ISO 2768-M			
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE COPIED, REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE BUREAU.			BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tambaram, Chennai-600113			
TITLE: Automatic cap and sample feeder for capillation furnace in RAL.			DRAWING NO: BIS/PSOJ/WR-0094/13			
SCALE: 1:1			REV. NO.: 001			



NO. OF SETS OF TEST COUPLER		ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE		CITY		CIR No.	
DATE		DESIGN					
CHKD		CHKD		DATE			
APPRO		APPRO		DATE			
CONFIDENTIAL DRAWING THIS DRAWING IS THE SOLE PROPERTY OF THE COMPANY AND IS TO BE KEPT SECRET AND NOT TO BE LOANED, REPRODUCED, COPIED OR IN ANY MANNER DISCLOSED TO ANY OTHER PERSON WITHOUT APPROVAL FROM THE COMPANY.				TITLE: Automatic coupler and sample feeder for capillary furnace in RAL			
BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, T. Annamalai, Chennai-600113				DRAWING NO: BIS/SRO/WR-0284/14 REV NO:00			

Ball Screw Nut - FSU 2005-4



NO.	QTY	BY	UNIT	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	REVISIONS	DATE	BY	CHKD	DATE
001									
002									
003									
004									
005									
006									
007									
008									
009									
010									
011									
012									
013									
014									
015									
016									
017									
018									
019									
020									
021									
022									
023									
024									
025									
026									
027									
028									
029									
030									
031									
032									
033									
034									
035									
036									
037									
038									
039									
040									
041									
042									
043									
044									
045									
046									
047									
048									
049									
050									
051									
052									
053									
054									
055									
056									
057									
058									
059									
060									
061									
062									
063									
064									
065									
066									
067									
068									
069									
070									
071									
072									
073									
074									
075									
076									
077									
078									
079									
080									
081									
082									
083									
084									
085									
086									
087									
088									
089									
090									
091									
092									
093									
094									
095									
096									
097									
098									
099									
100									

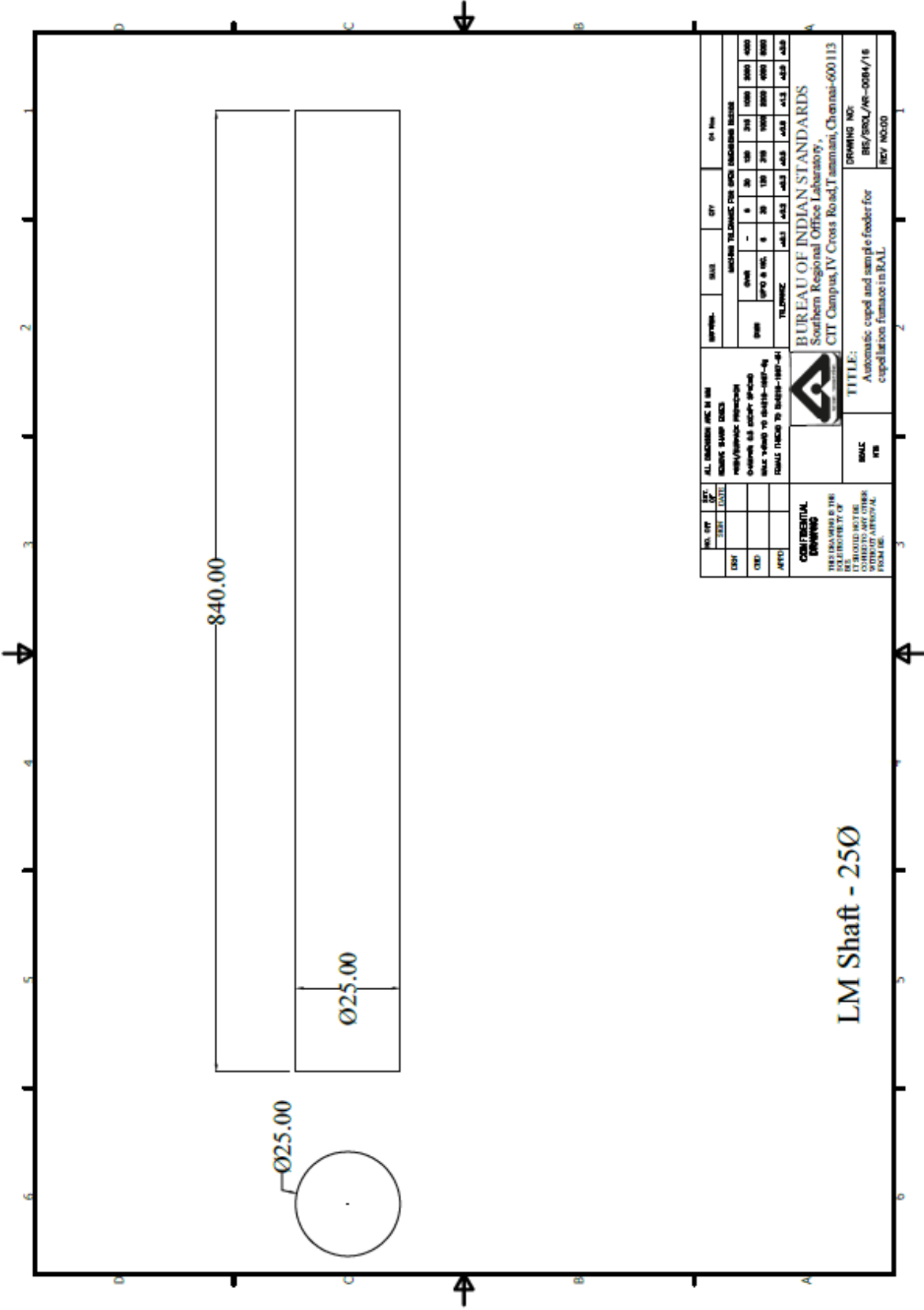
BUREAU OF INDIAN STANDARDS
 Southern Regional Office Laboratory,
 CIT Clampus, IV Cross Road, Taramani, Chennai-600113

CONFIDENTIAL DRAWING
 THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE BUREAU.

TITLE:
 Automatic cup and sample feeder for cuped laton furnace in RAL

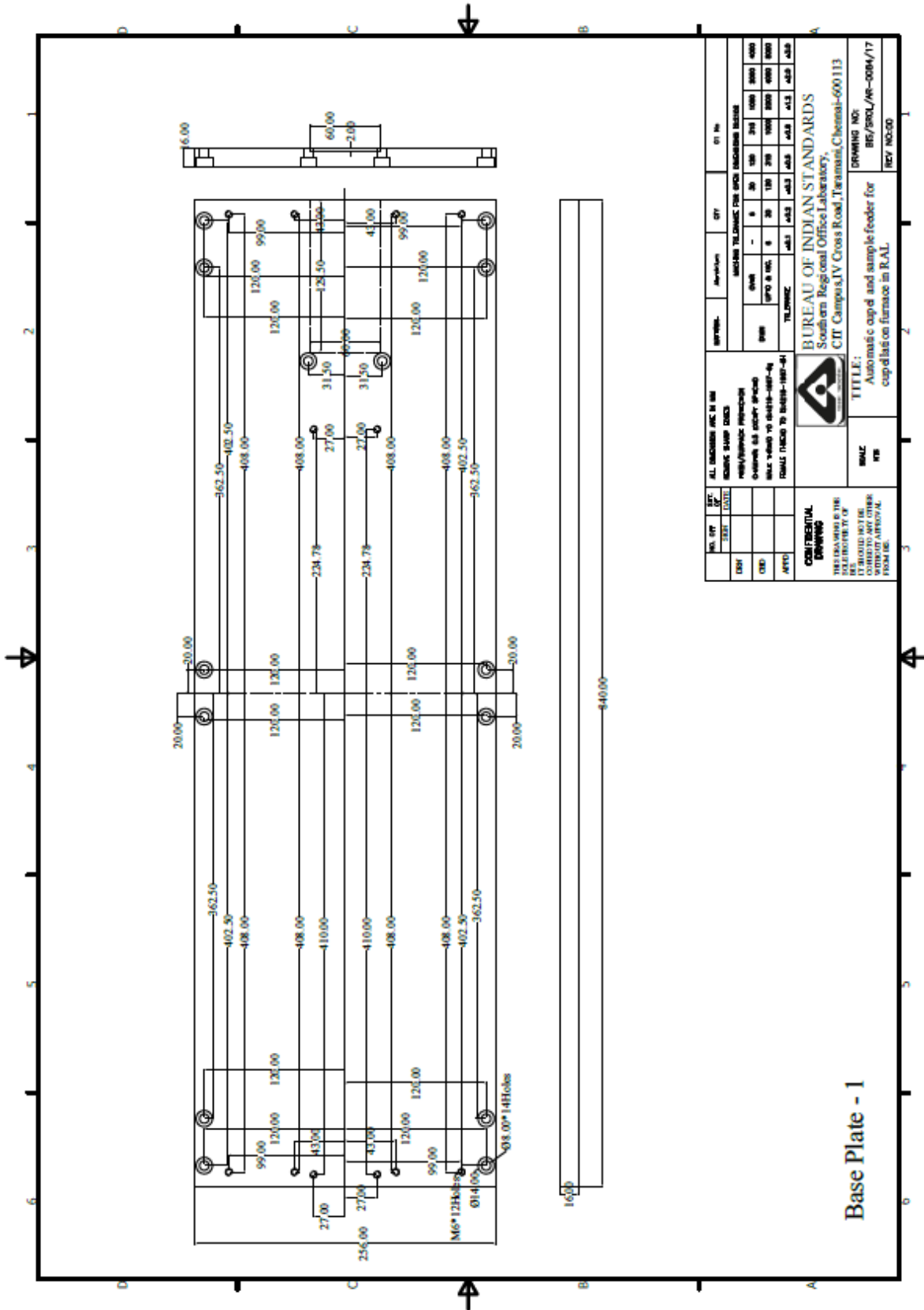
DRAWING NO:
 BR/SOUL/RE-0084/15

REV NO:00



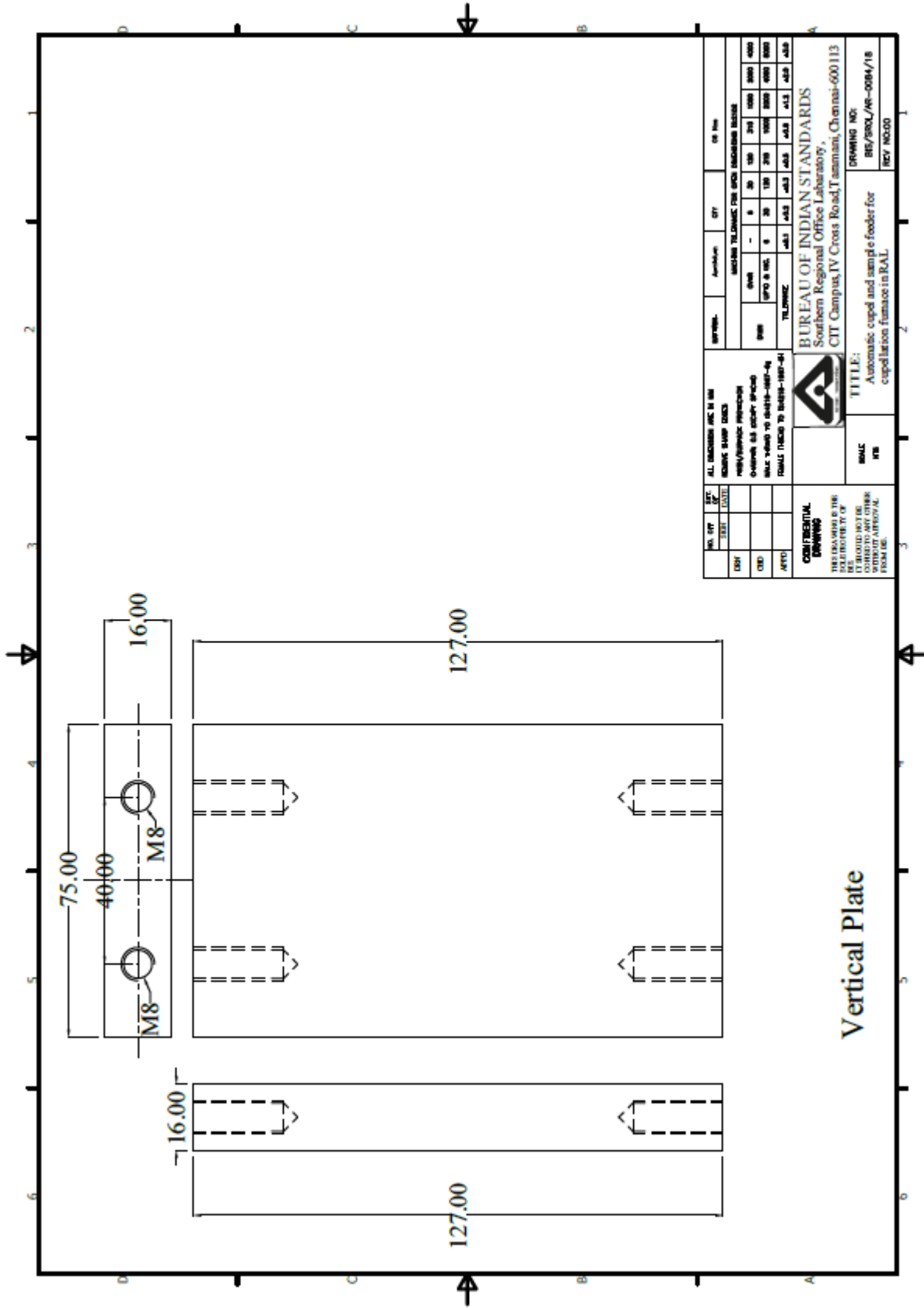
NO. OF TEST	DET. OF TEST	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	SCALE	MATERIAL	QTY	QTY IN NOS					
						1000	500	250	100	50	25
DATE	TEST DATE	REVISIONS	BY	DATE	BY	DATE	BY	DATE	BY	DATE	BY
<p>CONFIDENTIAL DRAWING</p> <p>THIS DRAWING IS THE SOLE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE LOANED TO ANY OTHERS WITHOUT APPROVAL FROM I.S.I.</p>		<p>BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tammam, Chennai-600 113</p>		<p>TITLE: Automatic cup and sample feeder for cupellation furnace in RAL</p>		<p>SCALE: 1/16</p>		<p>DRAWING NO: BIS/SRO/RS-0084/16 REV. NO.00</p>			

LM Shaft - 250

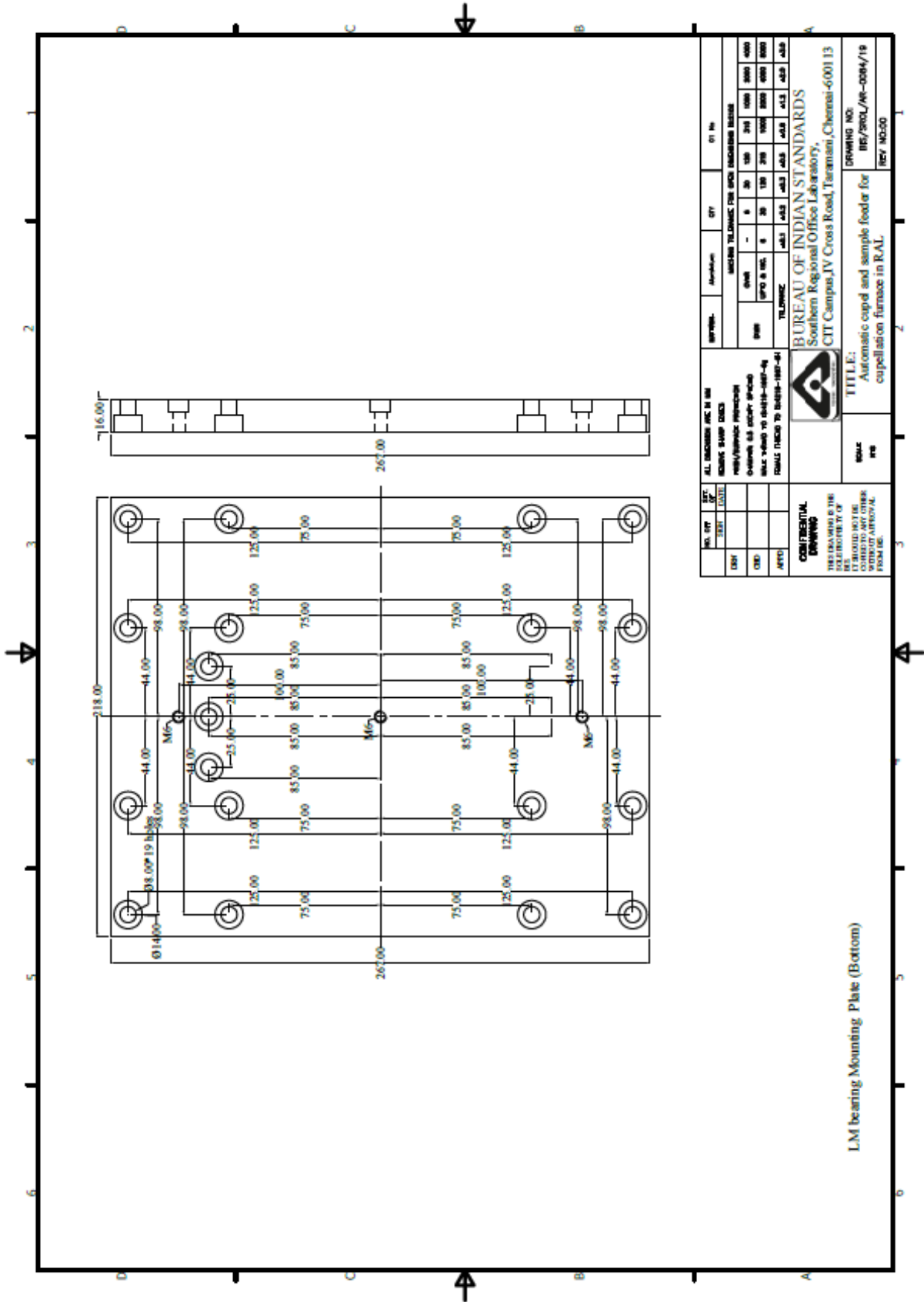


REV	DATE	BY	APP'D	DESCRIPTION	REV	DATE	BY	APP'D	DESCRIPTION
001				ISSUE FOR FABRICATION	001				ISSUE FOR FABRICATION
002				REVISIONS	002				REVISIONS
003				REVISIONS	003				REVISIONS
004				REVISIONS	004				REVISIONS
005				REVISIONS	005				REVISIONS
006				REVISIONS	006				REVISIONS
007				REVISIONS	007				REVISIONS
008				REVISIONS	008				REVISIONS
009				REVISIONS	009				REVISIONS
010				REVISIONS	010				REVISIONS
011				REVISIONS	011				REVISIONS
012				REVISIONS	012				REVISIONS
013				REVISIONS	013				REVISIONS
014				REVISIONS	014				REVISIONS
015				REVISIONS	015				REVISIONS
016				REVISIONS	016				REVISIONS
017				REVISIONS	017				REVISIONS
018				REVISIONS	018				REVISIONS
019				REVISIONS	019				REVISIONS
020				REVISIONS	020				REVISIONS

Base Plate - 1



NO.	REV.	DATE	BY	CHKD.	APPD.	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE			MATERIALS TO BE USED			MATERIALS TO BE USED									
						SYMBOL	DESCRIPTION	QTY	SYMBOL	DESCRIPTION	QTY	SYMBOL	DESCRIPTION	QTY							
						BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600 113						DRAWING NO: BSI/GRD/AE-0084/18 REV NO:00									



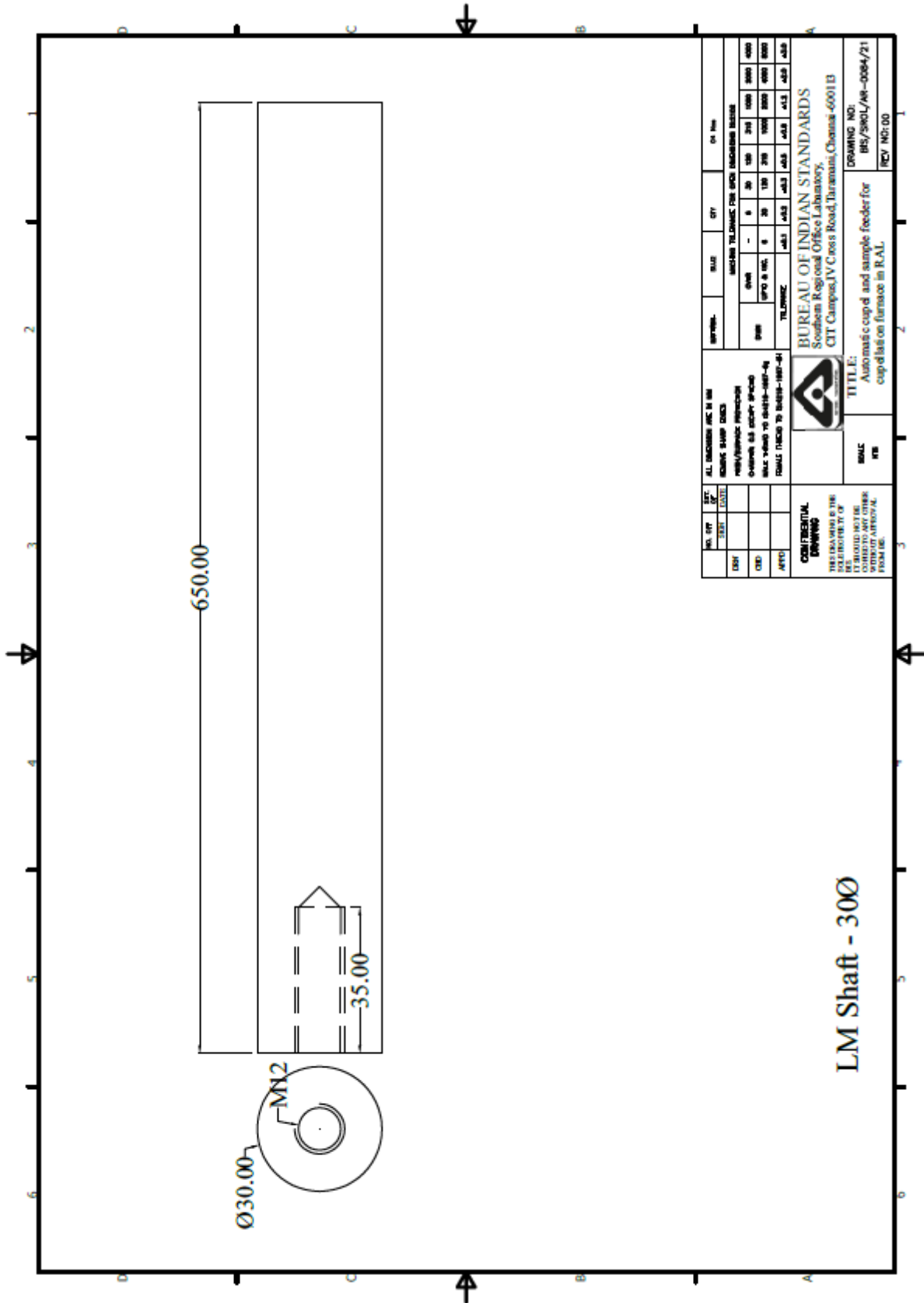
REV	DATE	BY	CHKD	APPD	DESCRIPTION	MATERIAL	QTY	GT No
					ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE			
					OVERALL DIMENSIONS ARE AS SHOWN UNLESS OTHERWISE SPECIFIED			
					CONFORM TO ISIRI: IS 2768			
					CONFORM TO ISIRI: IS 2769			
					CONFORM TO ISIRI: IS 2770			
					CONFORM TO ISIRI: IS 2771			
					CONFORM TO ISIRI: IS 2772			
					CONFORM TO ISIRI: IS 2773			
					CONFORM TO ISIRI: IS 2774			
					CONFORM TO ISIRI: IS 2775			
					CONFORM TO ISIRI: IS 2776			
					CONFORM TO ISIRI: IS 2777			
					CONFORM TO ISIRI: IS 2778			
					CONFORM TO ISIRI: IS 2779			
					CONFORM TO ISIRI: IS 2780			
					CONFORM TO ISIRI: IS 2781			
					CONFORM TO ISIRI: IS 2782			
					CONFORM TO ISIRI: IS 2783			
					CONFORM TO ISIRI: IS 2784			
					CONFORM TO ISIRI: IS 2785			
					CONFORM TO ISIRI: IS 2786			
					CONFORM TO ISIRI: IS 2787			
					CONFORM TO ISIRI: IS 2788			
					CONFORM TO ISIRI: IS 2789			
					CONFORM TO ISIRI: IS 2790			
					CONFORM TO ISIRI: IS 2791			
					CONFORM TO ISIRI: IS 2792			
					CONFORM TO ISIRI: IS 2793			
					CONFORM TO ISIRI: IS 2794			
					CONFORM TO ISIRI: IS 2795			
					CONFORM TO ISIRI: IS 2796			
					CONFORM TO ISIRI: IS 2797			
					CONFORM TO ISIRI: IS 2798			
					CONFORM TO ISIRI: IS 2799			
					CONFORM TO ISIRI: IS 2800			
					CONFORM TO ISIRI: IS 2801			
					CONFORM TO ISIRI: IS 2802			
					CONFORM TO ISIRI: IS 2803			
					CONFORM TO ISIRI: IS 2804			
					CONFORM TO ISIRI: IS 2805			
					CONFORM TO ISIRI: IS 2806			
					CONFORM TO ISIRI: IS 2807			
					CONFORM TO ISIRI: IS 2808			
					CONFORM TO ISIRI: IS 2809			
					CONFORM TO ISIRI: IS 2810			
					CONFORM TO ISIRI: IS 2811			
					CONFORM TO ISIRI: IS 2812			
					CONFORM TO ISIRI: IS 2813			
					CONFORM TO ISIRI: IS 2814			
					CONFORM TO ISIRI: IS 2815			
					CONFORM TO ISIRI: IS 2816			
					CONFORM TO ISIRI: IS 2817			
					CONFORM TO ISIRI: IS 2818			
					CONFORM TO ISIRI: IS 2819			
					CONFORM TO ISIRI: IS 2820			
					CONFORM TO ISIRI: IS 2821			
					CONFORM TO ISIRI: IS 2822			
					CONFORM TO ISIRI: IS 2823			
					CONFORM TO ISIRI: IS 2824			
					CONFORM TO ISIRI: IS 2825			
					CONFORM TO ISIRI: IS 2826			
					CONFORM TO ISIRI: IS 2827			
					CONFORM TO ISIRI: IS 2828			
					CONFORM TO ISIRI: IS 2829			
					CONFORM TO ISIRI: IS 2830			
					CONFORM TO ISIRI: IS 2831			
					CONFORM TO ISIRI: IS 2832			
					CONFORM TO ISIRI: IS 2833			
					CONFORM TO ISIRI: IS 2834			
					CONFORM TO ISIRI: IS 2835			
					CONFORM TO ISIRI: IS 2836			
					CONFORM TO ISIRI: IS 2837			
					CONFORM TO ISIRI: IS 2838			
					CONFORM TO ISIRI: IS 2839			
					CONFORM TO ISIRI: IS 2840			
					CONFORM TO ISIRI: IS 2841			
					CONFORM TO ISIRI: IS 2842			
					CONFORM TO ISIRI: IS 2843			
					CONFORM TO ISIRI: IS 2844			
					CONFORM TO ISIRI: IS 2845			
					CONFORM TO ISIRI: IS 2846			
					CONFORM TO ISIRI: IS 2847			
					CONFORM TO ISIRI: IS 2848			
					CONFORM TO ISIRI: IS 2849			
					CONFORM TO ISIRI: IS 2850			

BUREAU OF INDIAN STANDARDS
Southern Regional Office Laboratory,
CIT Campus, IV Cross Road, Taramani, Chennai-600113

TITLE:
Automatic capul and sample feeder for
cupellation furnace in RAL.

DRAWING NO:
BS/980L/AR-0094/19

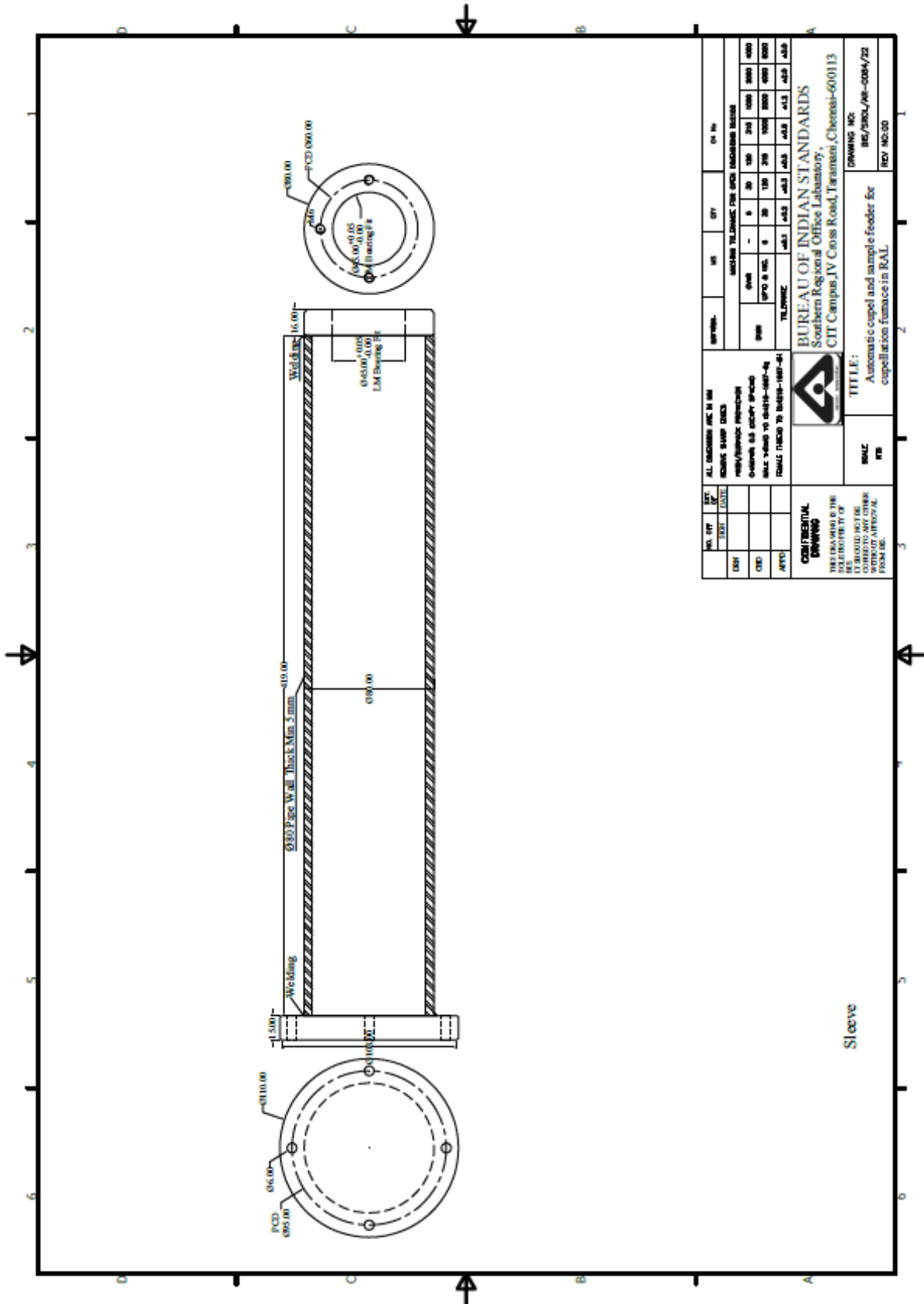
REV NO:00



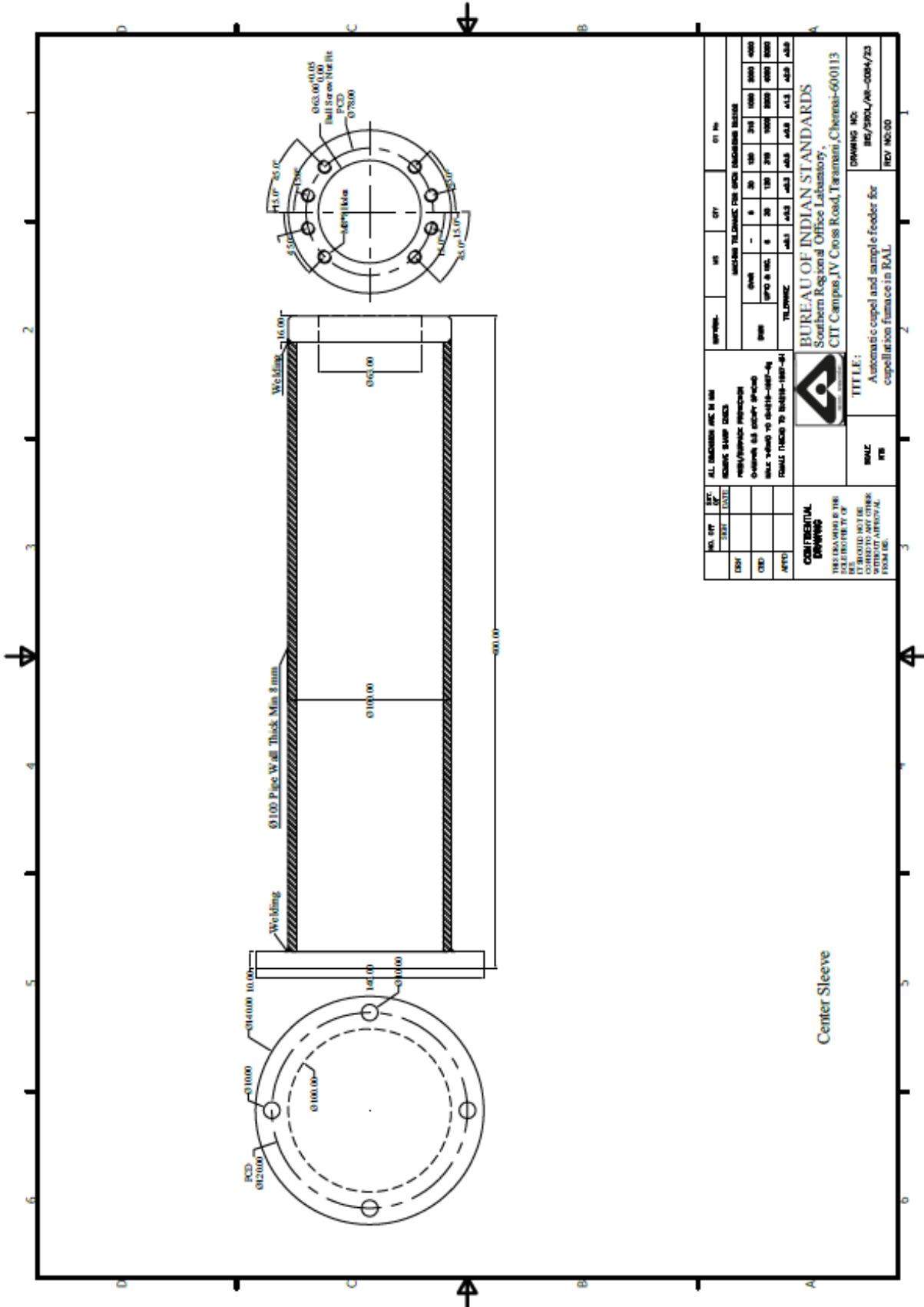
NO.	QTY	BY	DATE	REVISIONS	DESCRIPTION	DATE	QTY	BY	DATE	MATERIAL		QTY	BY	DATE
										GRADE	QTY			
1	1				LM SHAFT									
2	1				LM SHAFT									

ALL DIMENSIONS ARE IN MM EXCEPT SHARP CORNERS PER/STANDARD PRACTICES DIMENSIONS TO BE CHECKED MAKE REFERENCE TO IS: 1020-1982-04 FORMS TO BE USED: 1020-1982-04	BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, JVC Cross Road, Taramani, Chennai - 600113
CONFIDENTIAL INFORMATION	ISIRI 1020
THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS IT SHOULD NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT A REPRODUCTION FEE.	TITLE: Auto made cup and sample feeder for cup and lid on furnace in R.A.L.
DRAWING NO. ISIRI/SRIL/WH-0084/21	REV. NO. 00

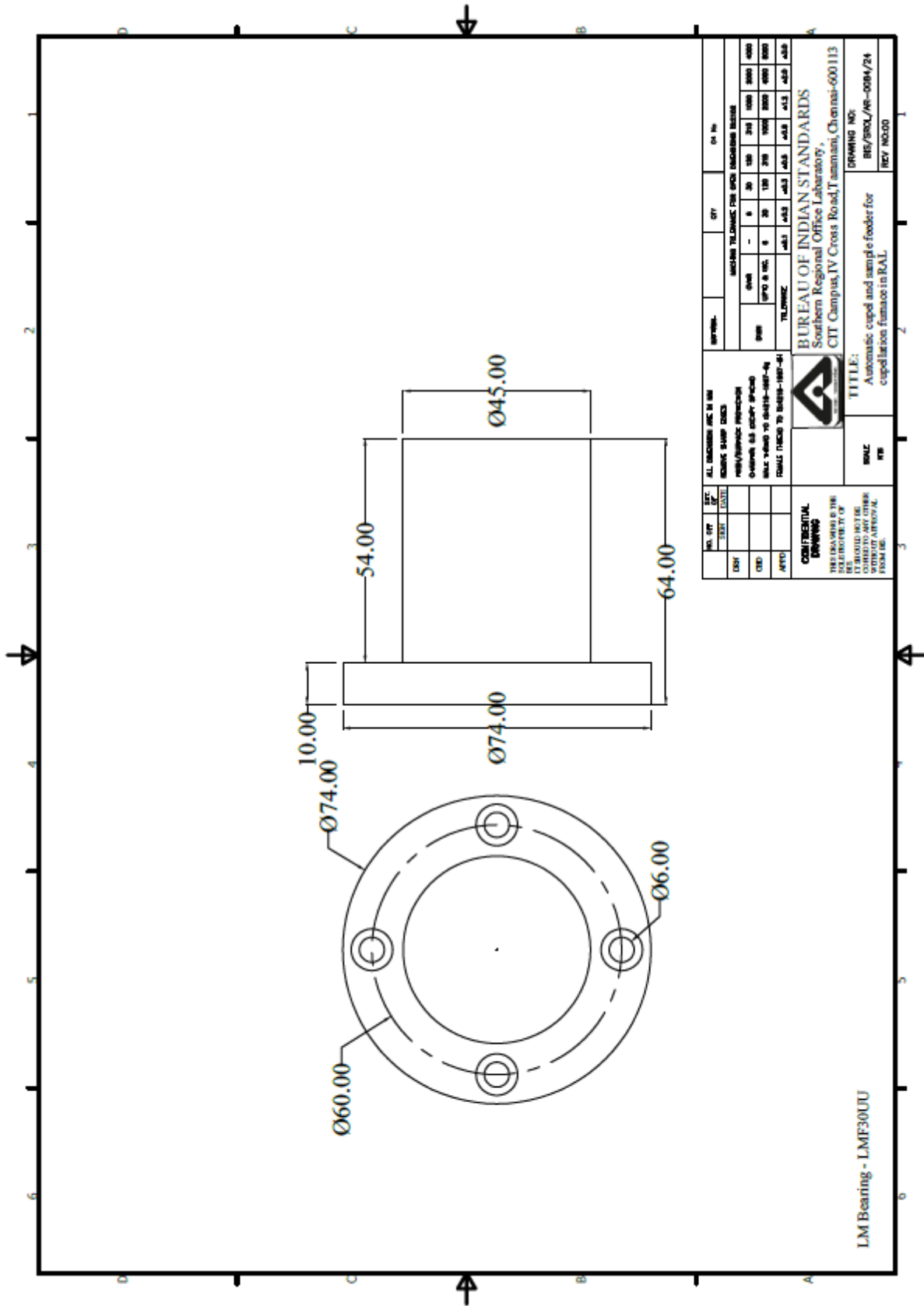
LM Shaft - 300



NO.	REV.	DATE	BY	CHKD.	APPD.	DESCRIPTION
1						ISSUED FOR MANUFACTURE
2						REVISIONS
3						REVISIONS
4						REVISIONS
5						REVISIONS
6						REVISIONS
7						REVISIONS
8						REVISIONS
9						REVISIONS
10						REVISIONS
11						REVISIONS
12						REVISIONS
13						REVISIONS
14						REVISIONS
15						REVISIONS
16						REVISIONS
17						REVISIONS
18						REVISIONS
19						REVISIONS
20						REVISIONS
21						REVISIONS
22						REVISIONS
23						REVISIONS
24						REVISIONS
25						REVISIONS
26						REVISIONS
27						REVISIONS
28						REVISIONS
29						REVISIONS
30						REVISIONS
31						REVISIONS
32						REVISIONS
33						REVISIONS
34						REVISIONS
35						REVISIONS
36						REVISIONS
37						REVISIONS
38						REVISIONS
39						REVISIONS
40						REVISIONS
41						REVISIONS
42						REVISIONS
43						REVISIONS
44						REVISIONS
45						REVISIONS
46						REVISIONS
47						REVISIONS
48						REVISIONS
49						REVISIONS
50						REVISIONS
51						REVISIONS
52						REVISIONS
53						REVISIONS
54						REVISIONS
55						REVISIONS
56						REVISIONS
57						REVISIONS
58						REVISIONS
59						REVISIONS
60						REVISIONS
61						REVISIONS
62						REVISIONS
63						REVISIONS
64						REVISIONS
65						REVISIONS
66						REVISIONS
67						REVISIONS
68						REVISIONS
69						REVISIONS
70						REVISIONS
71						REVISIONS
72						REVISIONS
73						REVISIONS
74						REVISIONS
75						REVISIONS
76						REVISIONS
77						REVISIONS
78						REVISIONS
79						REVISIONS
80						REVISIONS
81						REVISIONS
82						REVISIONS
83						REVISIONS
84						REVISIONS
85						REVISIONS
86						REVISIONS
87						REVISIONS
88						REVISIONS
89						REVISIONS
90						REVISIONS
91						REVISIONS
92						REVISIONS
93						REVISIONS
94						REVISIONS
95						REVISIONS
96						REVISIONS
97						REVISIONS
98						REVISIONS
99						REVISIONS
100						REVISIONS



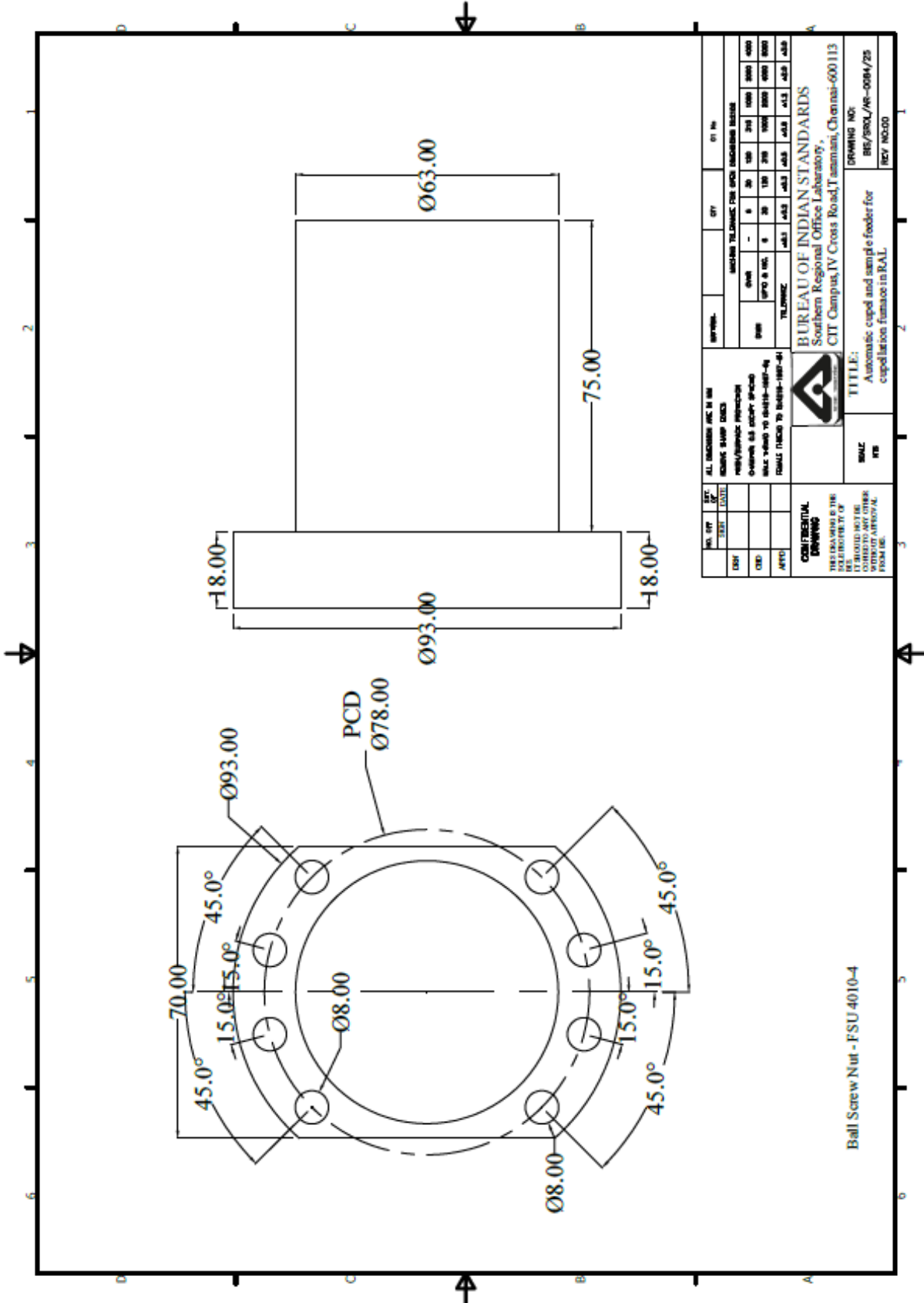
NO.	REV.	DATE	BY	CHKD.	APPD.	DESCRIPTION
1						ISSUED FOR FABRICATION
2						REVISIONS
3						REVISIONS
4						REVISIONS
5						REVISIONS
6						REVISIONS
7						REVISIONS
8						REVISIONS
9						REVISIONS
10						REVISIONS
11						REVISIONS
12						REVISIONS
13						REVISIONS
14						REVISIONS
15						REVISIONS
16						REVISIONS
17						REVISIONS
18						REVISIONS
19						REVISIONS
20						REVISIONS
21						REVISIONS
22						REVISIONS
23						REVISIONS
24						REVISIONS
25						REVISIONS
26						REVISIONS
27						REVISIONS
28						REVISIONS
29						REVISIONS
30						REVISIONS
31						REVISIONS
32						REVISIONS
33						REVISIONS
34						REVISIONS
35						REVISIONS
36						REVISIONS
37						REVISIONS
38						REVISIONS
39						REVISIONS
40						REVISIONS
41						REVISIONS
42						REVISIONS
43						REVISIONS
44						REVISIONS
45						REVISIONS
46						REVISIONS
47						REVISIONS
48						REVISIONS
49						REVISIONS
50						REVISIONS
51						REVISIONS
52						REVISIONS
53						REVISIONS
54						REVISIONS
55						REVISIONS
56						REVISIONS
57						REVISIONS
58						REVISIONS
59						REVISIONS
60						REVISIONS
61						REVISIONS
62						REVISIONS
63						REVISIONS
64						REVISIONS
65						REVISIONS
66						REVISIONS
67						REVISIONS
68						REVISIONS
69						REVISIONS
70						REVISIONS
71						REVISIONS
72						REVISIONS
73						REVISIONS
74						REVISIONS
75						REVISIONS
76						REVISIONS
77						REVISIONS
78						REVISIONS
79						REVISIONS
80						REVISIONS
81						REVISIONS
82						REVISIONS
83						REVISIONS
84						REVISIONS
85						REVISIONS
86						REVISIONS
87						REVISIONS
88						REVISIONS
89						REVISIONS
90						REVISIONS
91						REVISIONS
92						REVISIONS
93						REVISIONS
94						REVISIONS
95						REVISIONS
96						REVISIONS
97						REVISIONS
98						REVISIONS
99						REVISIONS
100						REVISIONS



NO.	QTY	BY	DATE	DESCRIPTION	MATERIAL	CITY	ON IN	MACHINE TOLERANCE FOR ISO 2875/1998 SYSTEM					
								IT	FS	FA	FM		
001	1			LM BEARING				H7	f8	12	12	12	12
002	1			LM BEARING				H7	f8	12	12	12	12
003	1			LM BEARING				H7	f8	12	12	12	12
004	1			LM BEARING				H7	f8	12	12	12	12
005	1			LM BEARING				H7	f8	12	12	12	12

ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE HOLE/SHAFT TOLERANCE DIMENSIONS ARE SHOWN IN PARENTHESES DIMENSIONS ARE SHOWN IN PARENTHESES DIMENSIONS ARE SHOWN IN PARENTHESES DIMENSIONS ARE SHOWN IN PARENTHESES		BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600113
CONFIDENTIAL DRAWING		
THIS DRAWING IS THE PROPERTY OF THE DRAWING OFFICE AND SHOULD NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT APPROVAL FROM THE DRAWING OFFICE.		
TITLE: Automatic cap and sample feeder for copulation furnace in RAL.	SCALE: 1:1	DRAWING NO.: BS/RSO/At-0084/24 REV. NO.00

LM Bearing - LMF30UU



NO. OF SHEET	REV. LIMIT	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	SYMBOL	UNIT	BY	DATE
1		INDIAN STANDARDS FOR METRIC TOLERANCES FOR HOLE AND SHAFTS		MM		
DATE		GENERAL USE DIMENSIONS TO 0.01mm-0.05mm		MM		
CHKD		INDIAN STANDARDS FOR METRIC TOLERANCES FOR HOLE AND SHAFTS		MM		
APPR		INDIAN STANDARDS FOR METRIC TOLERANCES FOR HOLE AND SHAFTS		MM		

CONFIDENTIAL DRAWING
 THIS DRAWING IS THE PROPERTY OF
 IT SHOULD NOT BE
 COPIED OR OTHER
 INFORMATION
 FROM THE

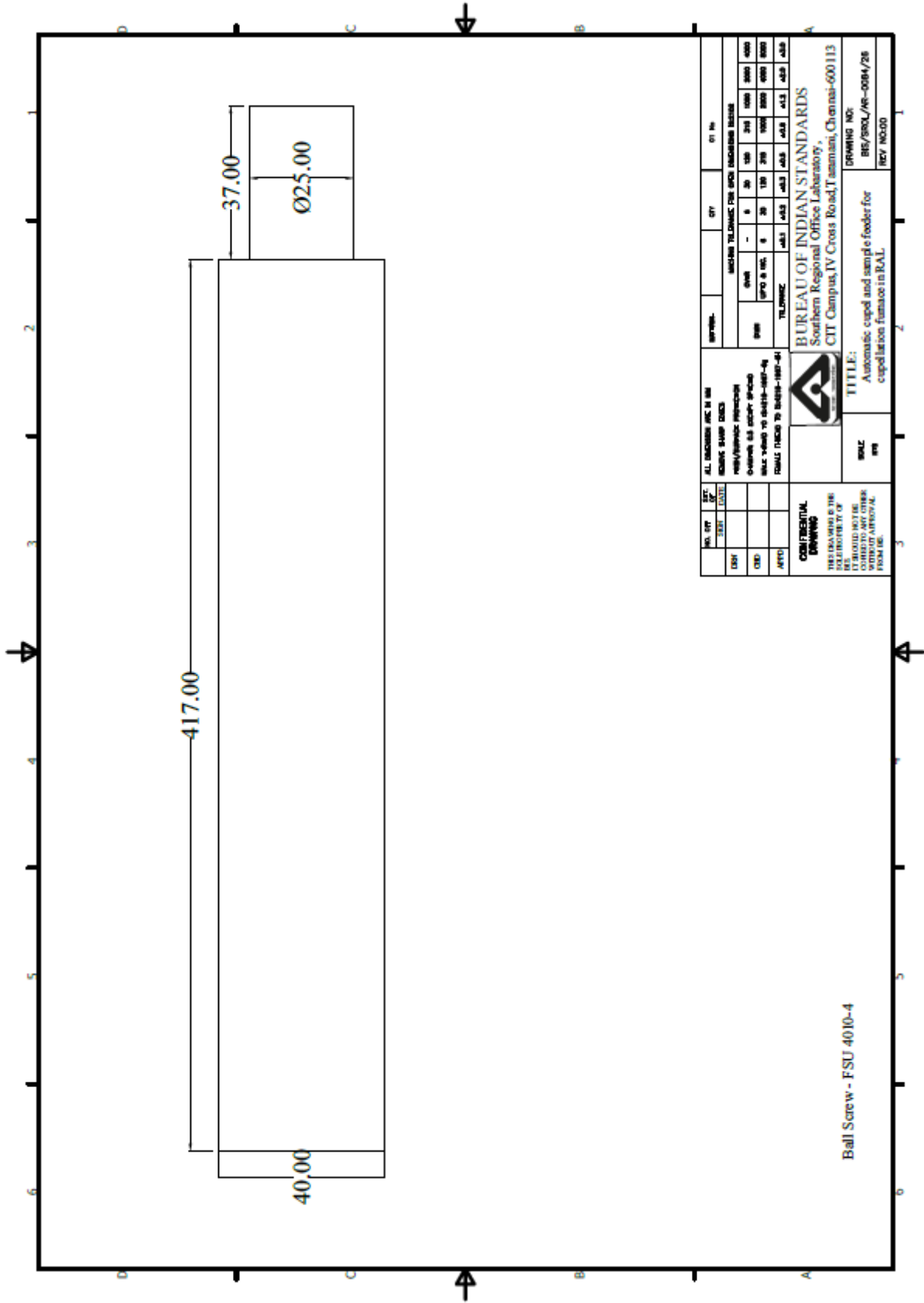
BUREAU OF INDIAN STANDARDS
 Southern Regional Office Laboratory,
 CIT Campus, IV Cross Road, Taramani, Chennai-600113

DRAWING NO:
 BS/900/AR-0084/25

TITLE:
 Automatic cap and sample feeder for
 copulation furnace in RAL

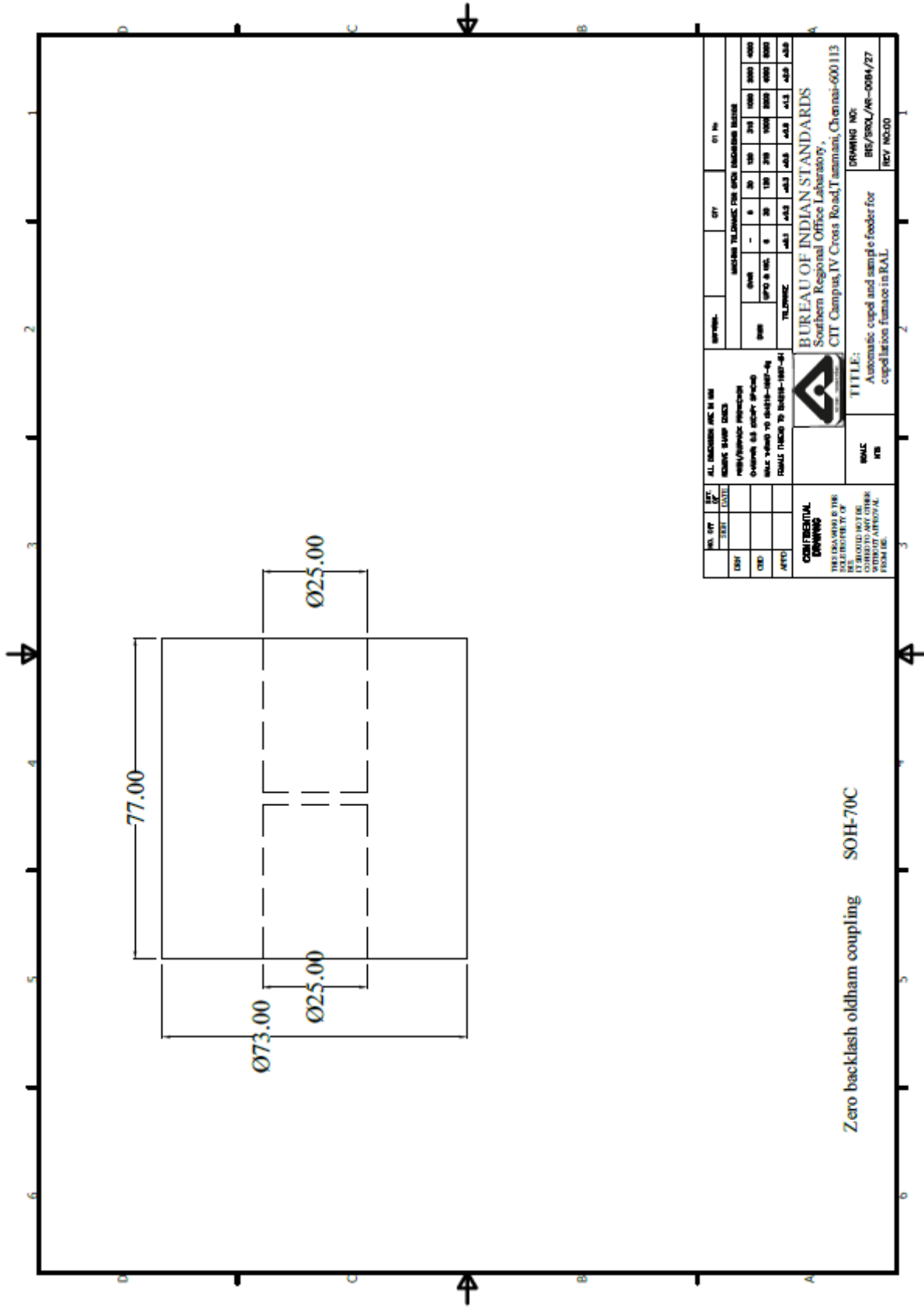
REV NO:00

Ball Screw Nut - FSU 4010-4



NO.	REV.	DATE	BY	APPD.	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	SYMBOL	QTY	QTY IN	MATERIAL	
									DESCRIPTION	GRADE
					STEEL					STEEL
					ALUMINUM					ALUMINUM
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE COPIED TO ANY OTHER PERSON WITHOUT THE WRITTEN APPROVAL FROM BUREAU OF INDIAN STANDARDS.					BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CITT Campus, IV Cross Road, Tammam, Chennai-600113					
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE COPIED TO ANY OTHER PERSON WITHOUT THE WRITTEN APPROVAL FROM BUREAU OF INDIAN STANDARDS.					TITLE: Automatic cup and sample feeder for capillary tubes in RAL					
SCALE: 1:1					DRAWING NO: BIS/SRO/WR-0084/26					
					REV/NO: 1/000					

Ball Screw - FSU 4010-4



Zero backlash oldham coupling SOH-70C

NO. OF SHEET	REV.	DATE	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	MATERIAL	CITY	DT No.	MACHINE TOLERANCES FOR UNLESS INDICATED OTHERWISE				
							FRACTION	DECIMAL	ANGLE	POSITION	
01			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
02			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
03			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
04			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
05			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
06			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
07			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
08			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
09			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
10			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
11			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
12			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
13			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
14			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
15			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
16			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
17			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
18			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
19			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
20			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
21			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
22			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
23			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
24			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
25			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
26			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
27			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
28			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
29			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
30			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
31			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
32			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
33			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
34			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
35			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
36			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
37			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
38			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
39			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
40			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
41			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
42			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
43			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
44			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
45			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
46			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
47			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
48			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
49			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
50			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
51			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
52			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
53			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
54			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
55			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
56			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
57			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
58			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
59			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
60			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
61			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
62			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
63			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
64			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
65			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
66			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05
67			PERMITS AS SHOWN UNLESS OTHERWISE SPECIFIED	STEEL			±0.15	±0.10	±0.05	±0.05	±0.05

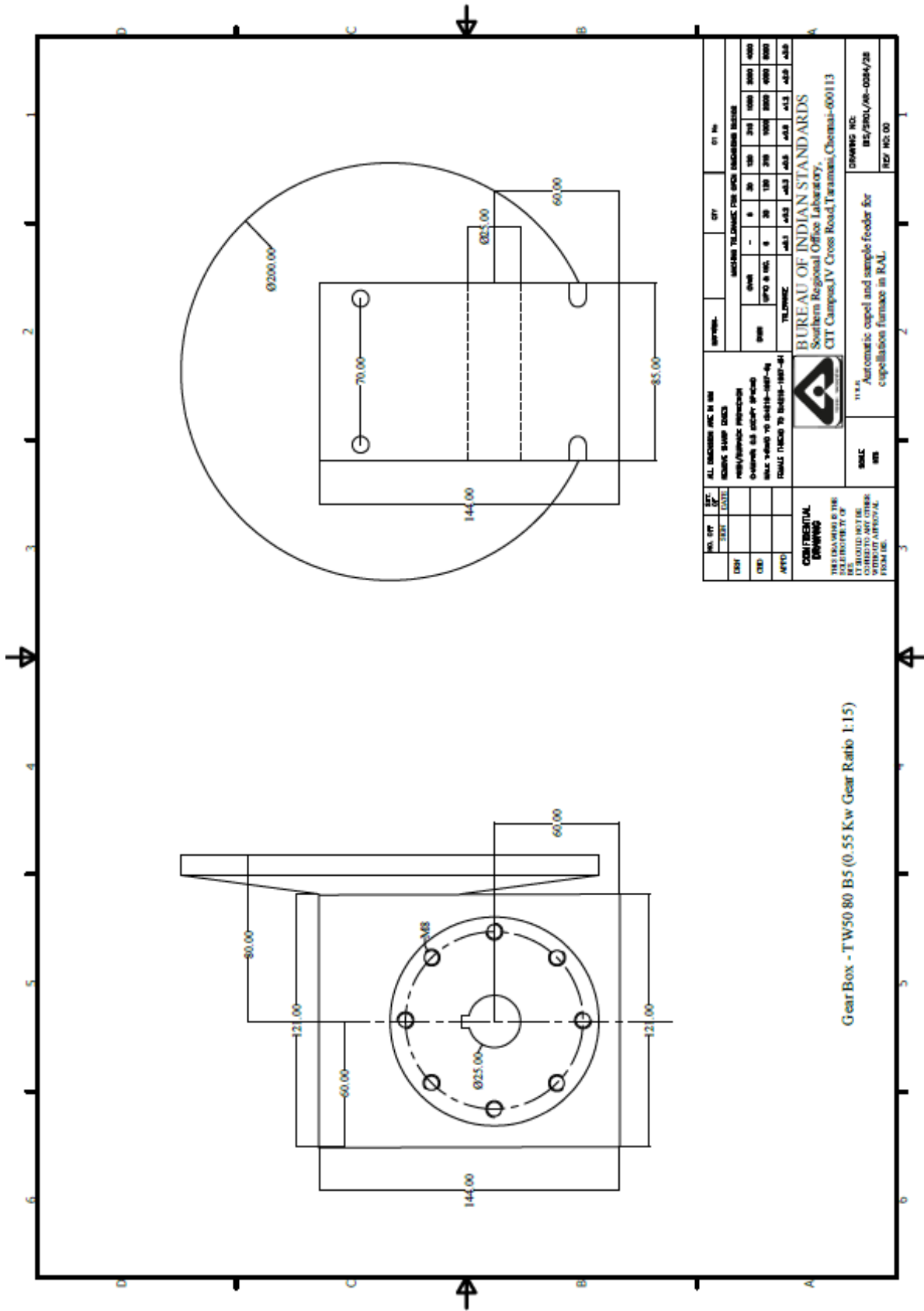
BUREAU OF INDIAN STANDARDS
 Southern Regional Office Laboratory,
 CIT Campus, IV Cross Road, Taramani, Chennai-600113

CONFIDENTIAL DRAWING
 THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT AUTHORIZATION FROM BUREAU OF INDIAN STANDARDS.

TITLE:
 Automatic cup and sample feeder for cupulation furnace in RAL

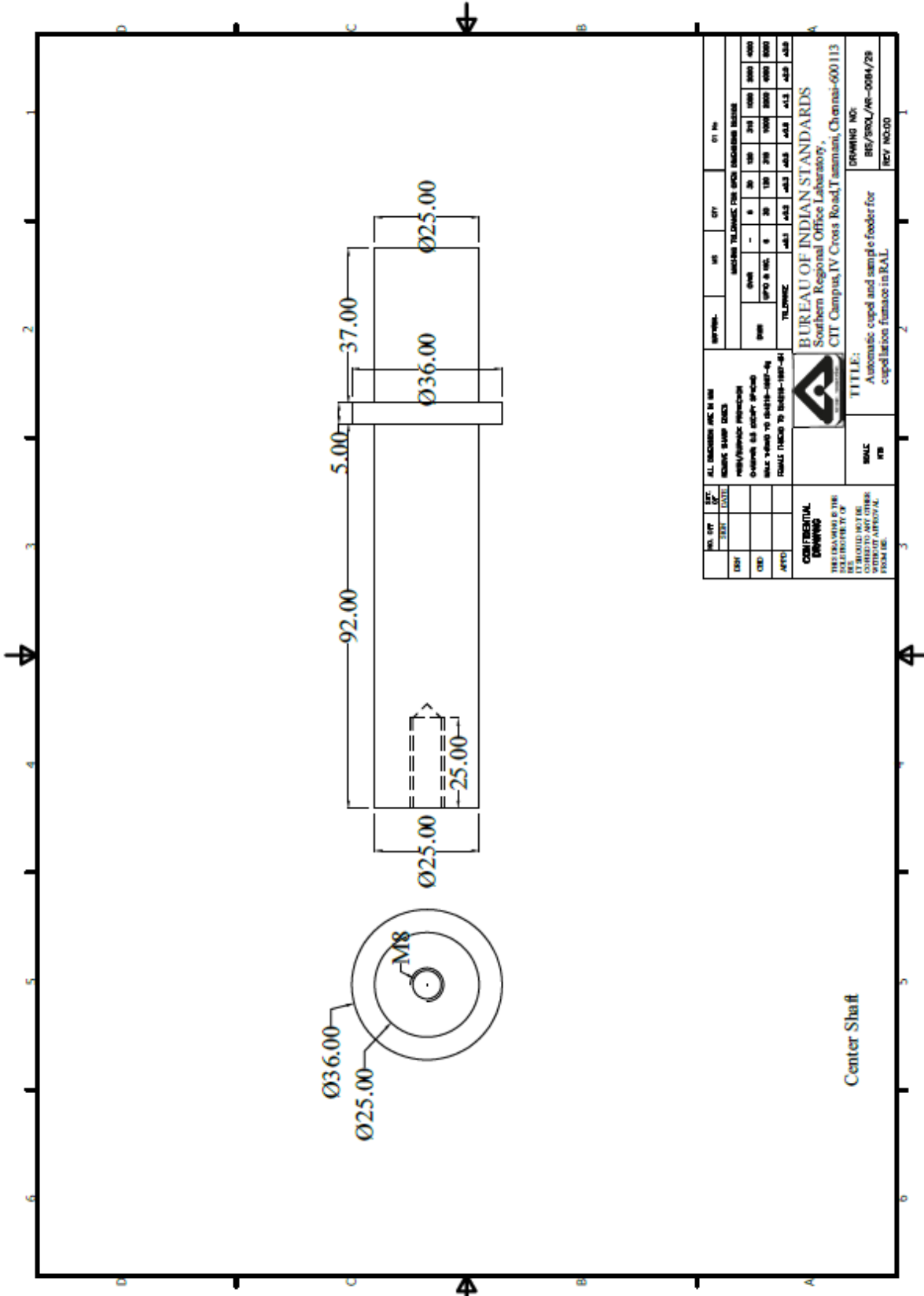
DRAWING NO:
 BE/SRO/L/AR-084/27

REV NO:00



Gear Box - T/W-50 80 B5 (0.55 Kw Gear Ratio 1:15)

NO.	QTY	LT.	BY	MATERIAL	DESCRIPTION	MATERIAL		QTY		QTY IN
						UNIT	QTY	UNIT	QTY	
001				STEEL	SHAFT	1	1	1	1	1
002				STEEL	GEAR	1	1	1	1	1
003				STEEL	KEY	1	1	1	1	1
004				STEEL	WASHER	2	2	2	2	2
005				STEEL	NUT	2	2	2	2	2
006				STEEL	WASHER	2	2	2	2	2
007				STEEL	NUT	2	2	2	2	2
008				STEEL	WASHER	2	2	2	2	2
009				STEEL	NUT	2	2	2	2	2
010				STEEL	WASHER	2	2	2	2	2
011				STEEL	NUT	2	2	2	2	2
012				STEEL	WASHER	2	2	2	2	2
013				STEEL	NUT	2	2	2	2	2
014				STEEL	WASHER	2	2	2	2	2
015				STEEL	NUT	2	2	2	2	2
016				STEEL	WASHER	2	2	2	2	2
017				STEEL	NUT	2	2	2	2	2
018				STEEL	WASHER	2	2	2	2	2
019				STEEL	NUT	2	2	2	2	2
020				STEEL	WASHER	2	2	2	2	2
021				STEEL	NUT	2	2	2	2	2
022				STEEL	WASHER	2	2	2	2	2
023				STEEL	NUT	2	2	2	2	2
024				STEEL	WASHER	2	2	2	2	2
025				STEEL	NUT	2	2	2	2	2
026				STEEL	WASHER	2	2	2	2	2
027				STEEL	NUT	2	2	2	2	2
028				STEEL	WASHER	2	2	2	2	2
029				STEEL	NUT	2	2	2	2	2
030				STEEL	WASHER	2	2	2	2	2
031				STEEL	NUT	2	2	2	2	2
032				STEEL	WASHER	2	2	2	2	2
033				STEEL	NUT	2	2	2	2	2
034				STEEL	WASHER	2	2	2	2	2
035				STEEL	NUT	2	2	2	2	2
036				STEEL	WASHER	2	2	2	2	2
037				STEEL	NUT	2	2	2	2	2
038				STEEL	WASHER	2	2	2	2	2
039				STEEL	NUT	2	2	2	2	2
040				STEEL	WASHER	2	2	2	2	2
041				STEEL	NUT	2	2	2	2	2
042				STEEL	WASHER	2	2	2	2	2
043				STEEL	NUT	2	2	2	2	2
044				STEEL	WASHER	2	2	2	2	2
045				STEEL	NUT	2	2	2	2	2
046				STEEL	WASHER	2	2	2	2	2
047				STEEL	NUT	2	2	2	2	2
048				STEEL	WASHER	2	2	2	2	2
049				STEEL	NUT	2	2	2	2	2
050				STEEL	WASHER	2	2	2	2	2
051				STEEL	NUT	2	2	2	2	2
052				STEEL	WASHER	2	2	2	2	2
053				STEEL	NUT	2	2	2	2	2
054				STEEL	WASHER	2	2	2	2	2
055				STEEL	NUT	2	2	2	2	2
056				STEEL	WASHER	2	2	2	2	2
057				STEEL	NUT	2	2	2	2	2
058				STEEL	WASHER	2	2	2	2	2
059				STEEL	NUT	2	2	2	2	2
060				STEEL	WASHER	2	2	2	2	2
061				STEEL	NUT	2	2	2	2	2
062				STEEL	WASHER	2	2	2	2	2
063				STEEL	NUT	2	2	2	2	2
064				STEEL	WASHER	2	2	2	2	2
065				STEEL	NUT	2	2	2	2	2
066				STEEL	WASHER	2	2	2	2	2
067				STEEL	NUT	2	2	2	2	2
068				STEEL	WASHER	2	2	2	2	2
069				STEEL	NUT	2	2	2	2	2
070				STEEL	WASHER	2	2	2	2	2
071				STEEL	NUT	2	2	2	2	2
072				STEEL	WASHER	2	2	2	2	2
073				STEEL	NUT	2	2	2	2	2
074				STEEL	WASHER	2	2	2	2	2
075				STEEL	NUT	2	2	2	2	2
076				STEEL	WASHER	2	2	2	2	2
077				STEEL	NUT	2	2	2	2	2
078				STEEL	WASHER	2	2	2	2	2
079				STEEL	NUT	2	2	2	2	2
080				STEEL	WASHER	2	2	2	2	2
081				STEEL	NUT	2	2	2	2	2
082				STEEL	WASHER	2	2	2	2	2
083				STEEL	NUT	2	2	2	2	2
084				STEEL	WASHER	2	2	2	2	2
085				STEEL	NUT	2	2	2	2	2
086				STEEL	WASHER	2	2	2	2	2
087				STEEL	NUT	2	2	2	2	2
088				STEEL	WASHER	2	2	2	2	2
089				STEEL	NUT	2	2	2	2	2
090				STEEL	WASHER	2	2	2	2	2
091				STEEL	NUT	2	2	2	2	2
092				STEEL	WASHER	2	2	2	2	2
093				STEEL	NUT	2	2	2	2	2
094				STEEL	WASHER	2	2	2	2	2
095				STEEL	NUT	2	2	2	2	2
096				STEEL	WASHER	2	2	2	2	2
097				STEEL	NUT	2	2	2	2	2
098				STEEL	WASHER	2	2	2	2	2
099				STEEL	NUT	2	2	2	2	2
100				STEEL	WASHER	2	2	2	2	2



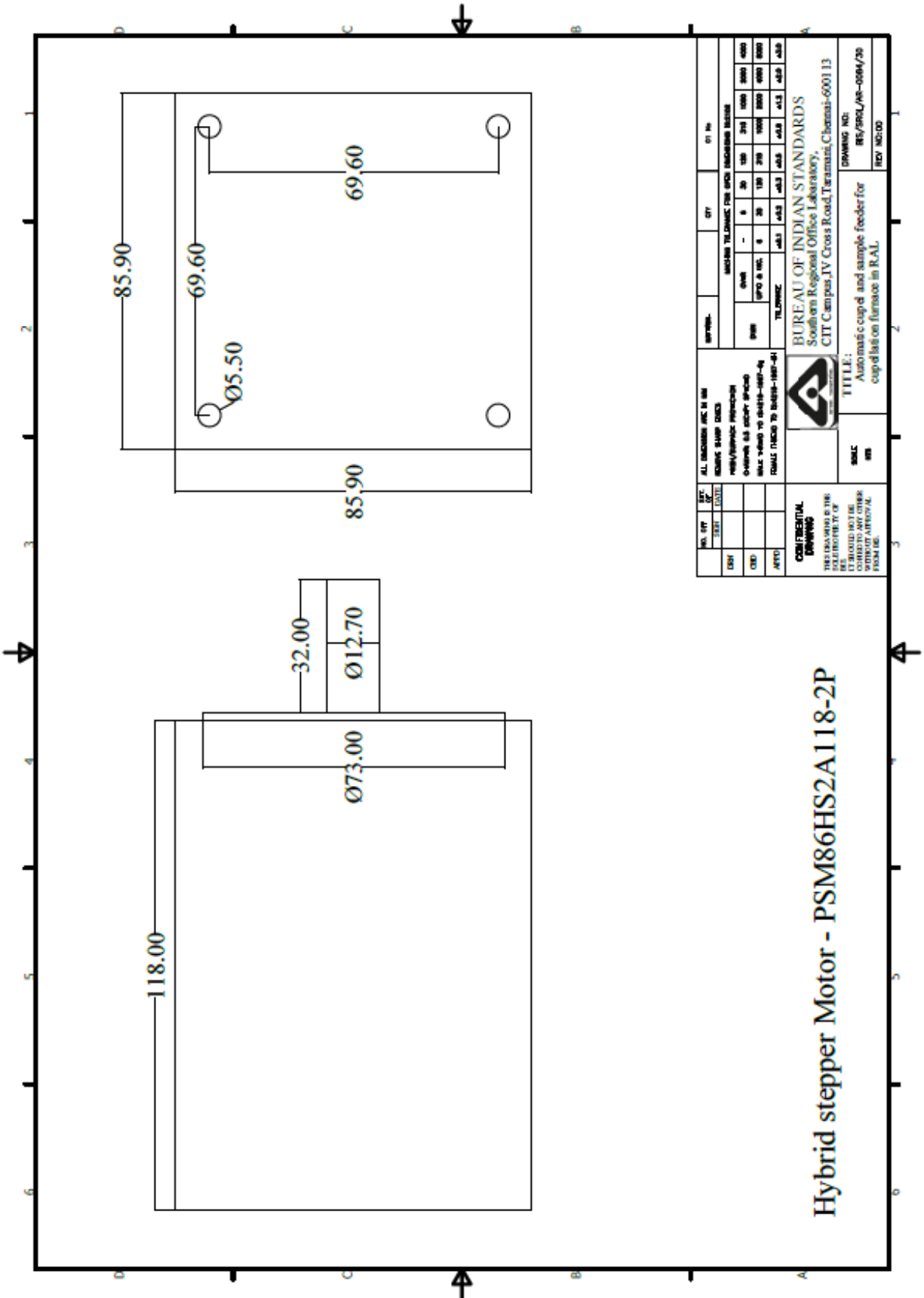
NO. OF SHEET	REV. DATE	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	REVISED REVISIONS	DATE	BY	CHKD	DATE
		INDIAN TELEPHONE FOR SPEC. ENGINEERING SECTION					
ENR		INDIAN TELEPHONE FOR SPEC. ENGINEERING SECTION					
CD		INDIAN TELEPHONE FOR SPEC. ENGINEERING SECTION					
APD		INDIAN TELEPHONE FOR SPEC. ENGINEERING SECTION					

BUREAU OF INDIAN STANDARDS
 Southern Regional Office Laboratory,
 CIT Campus, IV Cross Road, Taramani, Chennai-600 113

CONFIDENTIAL DRAWING
 THIS DRAWING IS THE PROPERTY OF THE BUREAU OF INDIAN STANDARDS AND SHOULD NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT APPROVAL FROM I.S.I.

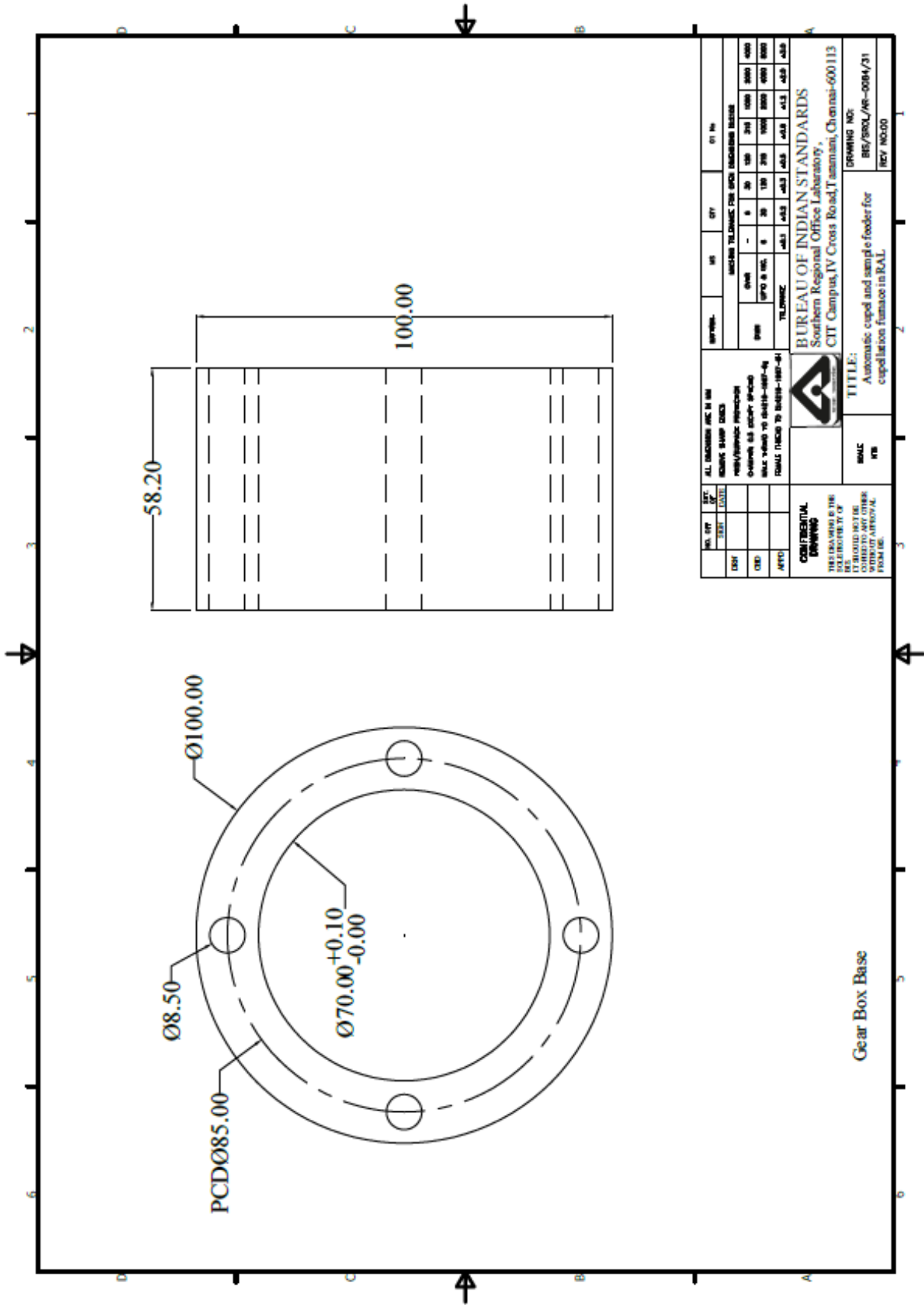
Center Shaft

DRAWING NO:
BS/GR/L/AE-0084/28
REV NO:00



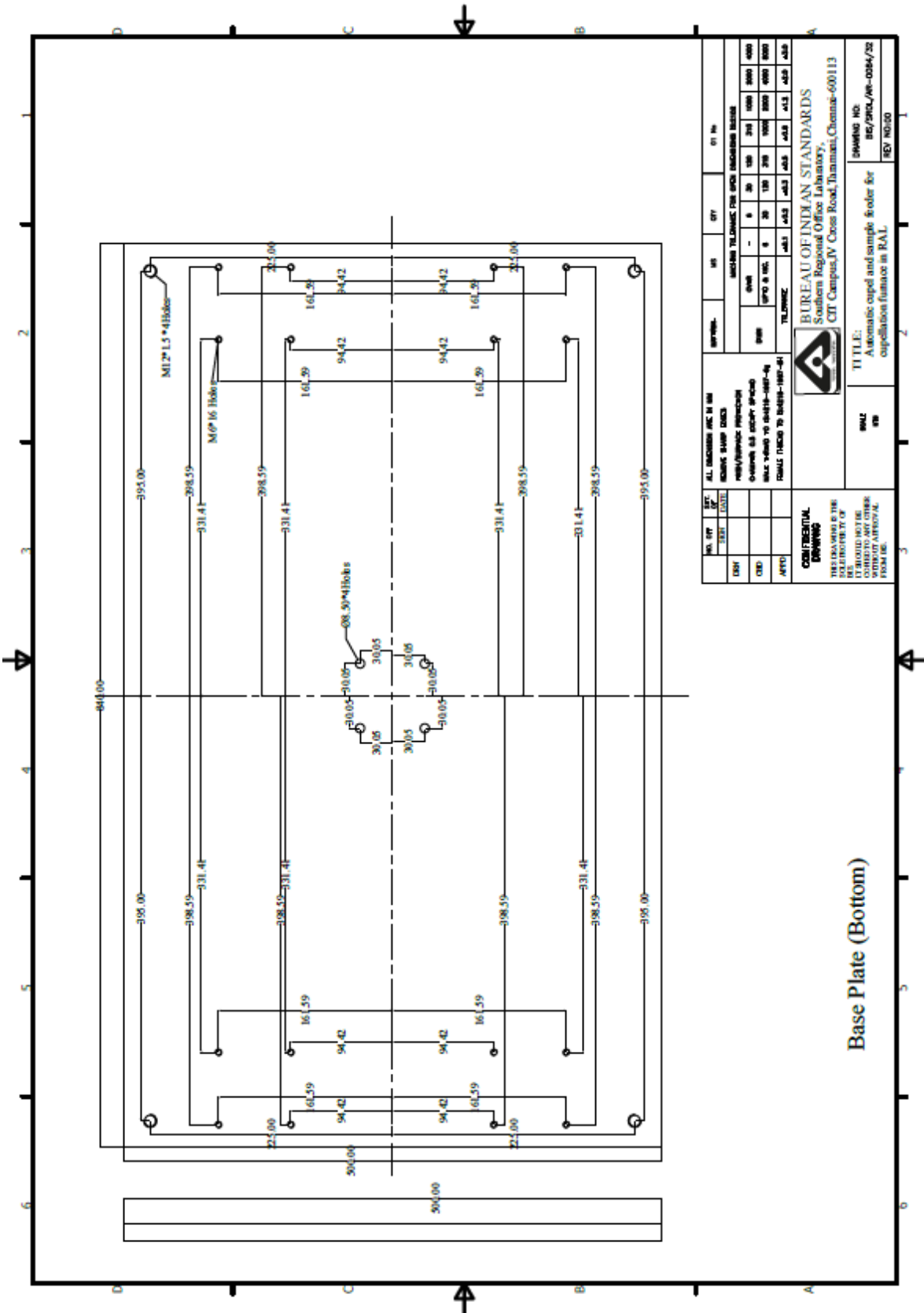
Hybrid stepper Motor - PSM86HS2A118-2P

NO. OF SHEET	1	DATE		ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE	SYMBOLS	CITY	DT No
DESIGN				PROJ/WORK/PROJECT 0-STEPPER 86 HS 2P-118-2P	INDIAN TELEPHONE FOR AUTO EXCHANGE NUMBER		
CHKD				SCALE 1:1	DATE	BY	NO
APPROV				SCALE 1:1	DATE	BY	NO
<p>CONFIDENTIAL DRAWING</p> <p>THIS DRAWING IS THE PROPERTY OF BLS. IT SHOULD NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT APPROVAL FROM BLS.</p>				<p>BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus IV Cross Road, Taramani, Chennai-600113</p>			
<p>TITLE: Automatic cup and sample feeder for cup of 100 on furnace in KAL.</p>				<p>DRAWING NO: BS/PSM/HS-0004/20</p>			
				<p>REV NO:00</p>			



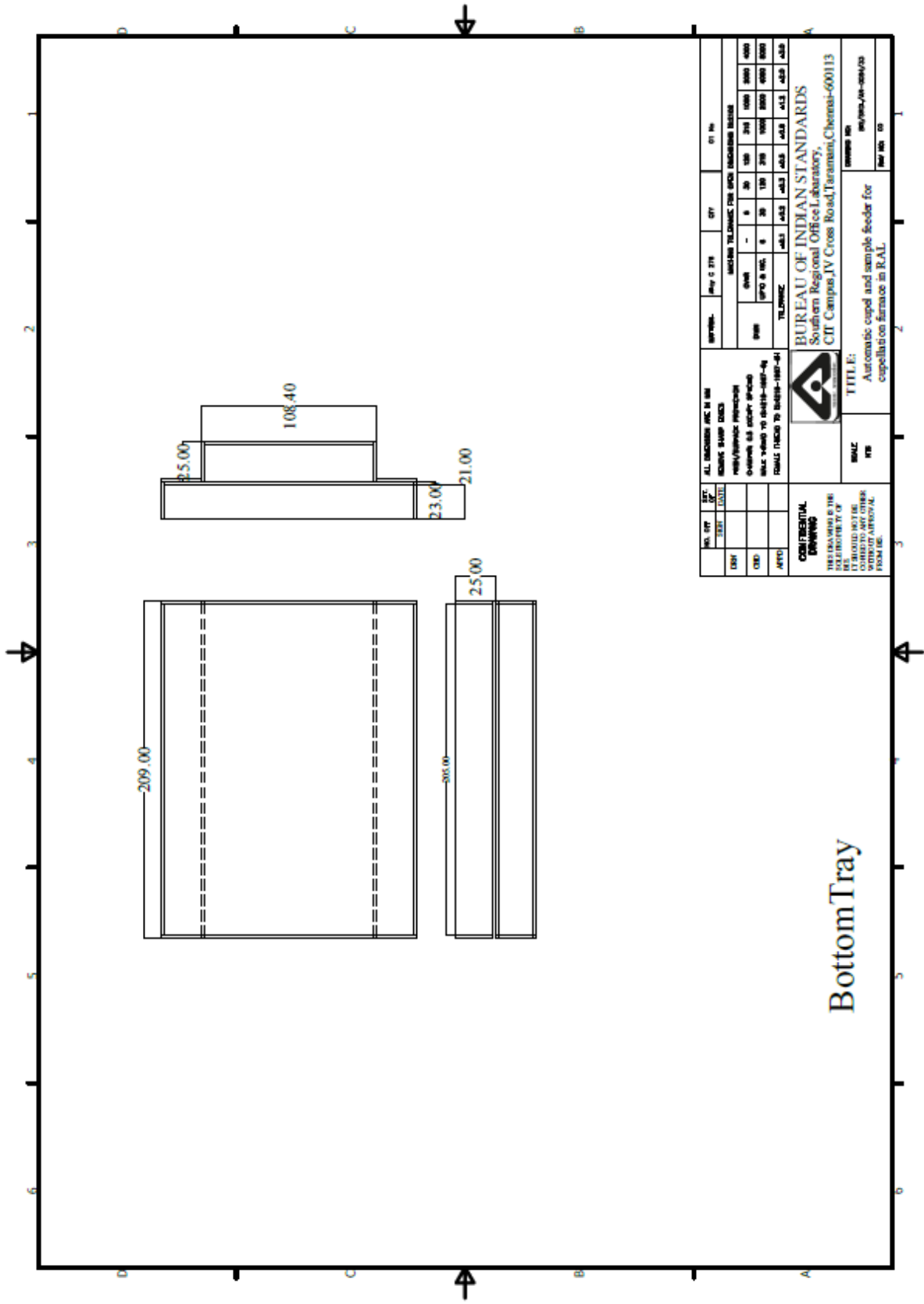
NO. OF SHEET	DATE	ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE	NO. OF SHEET	DATE	NO. OF SHEET
1	10/10/2018	INDIAN STANDARDS FOR METRIC SIZES	1	10/10/2018	1
DESIGN		INDIAN STANDARDS FOR METRIC SIZES	NO.		
CHKD		INDIAN STANDARDS FOR METRIC SIZES	DATE		
APPROV		INDIAN STANDARDS FOR METRIC SIZES	DATE		
CONFIDENTIAL DRAWING THIS DRAWING IS THE PROPERTY OF THE ORGANIZATION AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT APPROVAL FROM I.I.E.		BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tumkur, Chennai-600 113			
TITLE: Automatic cup and sample feeder for cupped larvae from rice in RAL.		DRAWING NO: BR/AR/L/AR-0084/31 REV: 0000			

Gear Box Base

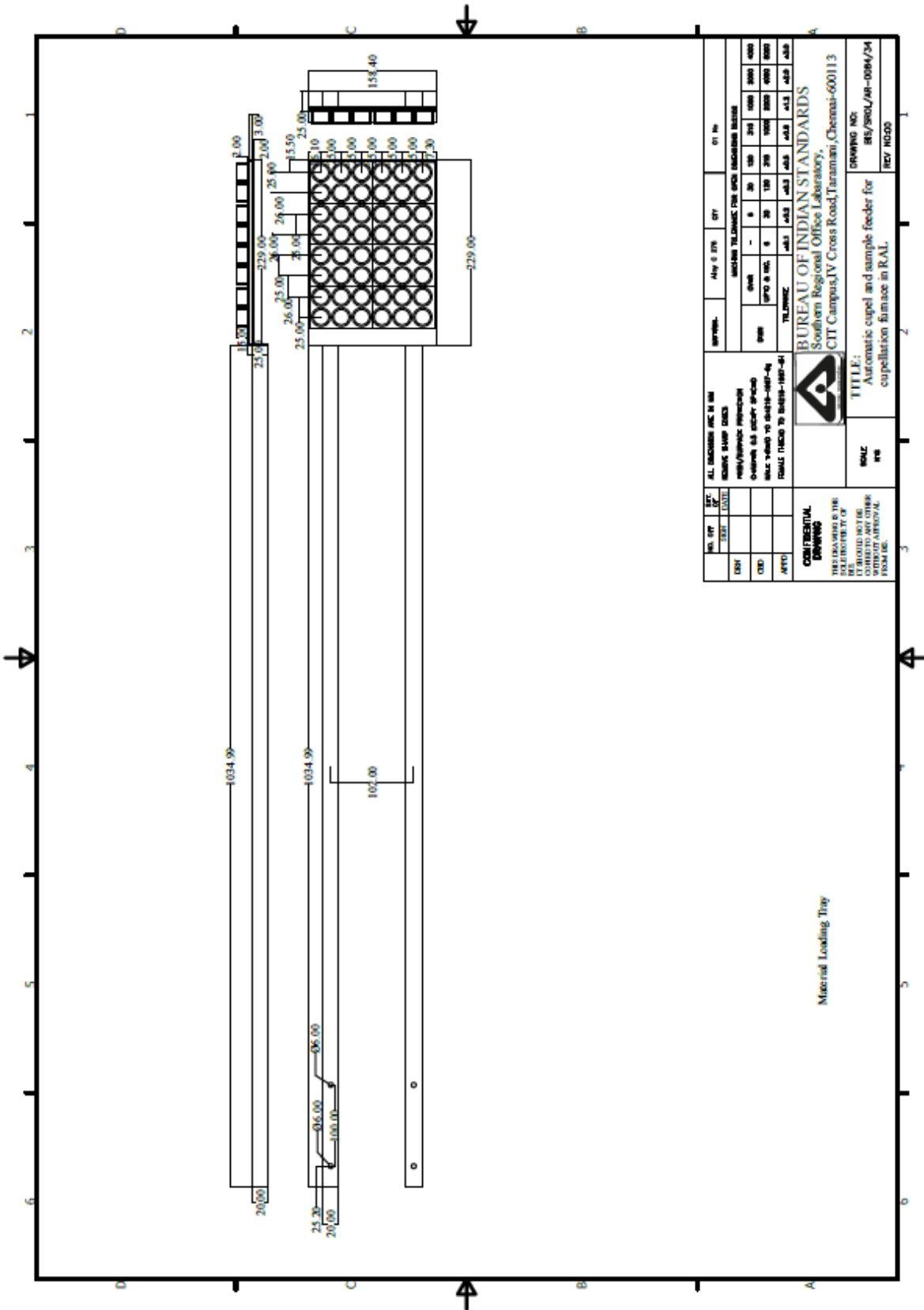


Base Plate (Bottom)

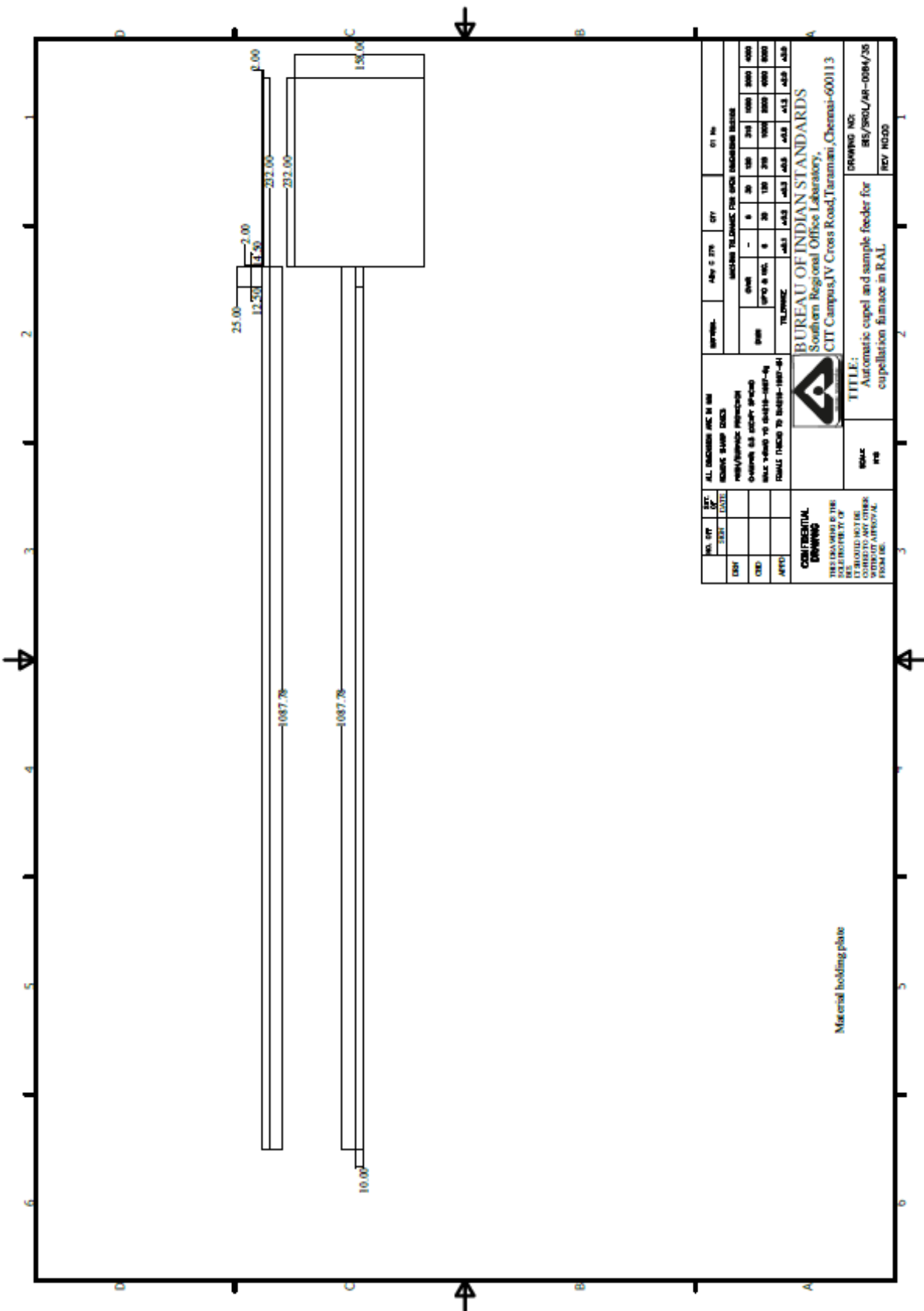
NO. OF SHEETS	REV. DATE	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	NO. OF SHEETS	REV. DATE	NO. OF SHEETS	REV. DATE	NO. OF SHEETS	REV. DATE
1			1		1		1	
DATE	DESIGNED BY	DESIGNED BY	DATE	DESIGNED BY	DESIGNED BY	DATE	DESIGNED BY	DESIGNED BY
APP'D			APP'D			APP'D		
CONFIDENTIAL DRAWING THIS DRAWING IS THE SOLE PROPERTY OF THE BUREAU OF INDIAN STANDARDS. IT IS LOANED TO YOU FOR YOUR INFORMATION ONLY. IT IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE APPROVAL OF THE BUREAU.			BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory CITI Campus, IV Cross Road, Thiruvananthapuram, Chennai-600113			TITLE: Automatic cuped and sample holder for expedition furnace in RAL.		
			SHEET NO: 002/002L/WR-0284/32			REV NO:00		



NO. OF TEST	CONFIDENTIAL DRAWING	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	REV. 0	DATE	BY	CHECKED BY	DATE	PROJECT	SHEET NO.	SECTION TELONGMEK FOR GOOD ENGINEERING SERVICE											
	BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Tumkur, Chennai-600113																				
	TITLE: Automatic cupped and sample feeder for copellation furnace in RAL																				
ENR																					
CRD																					
JETD																					

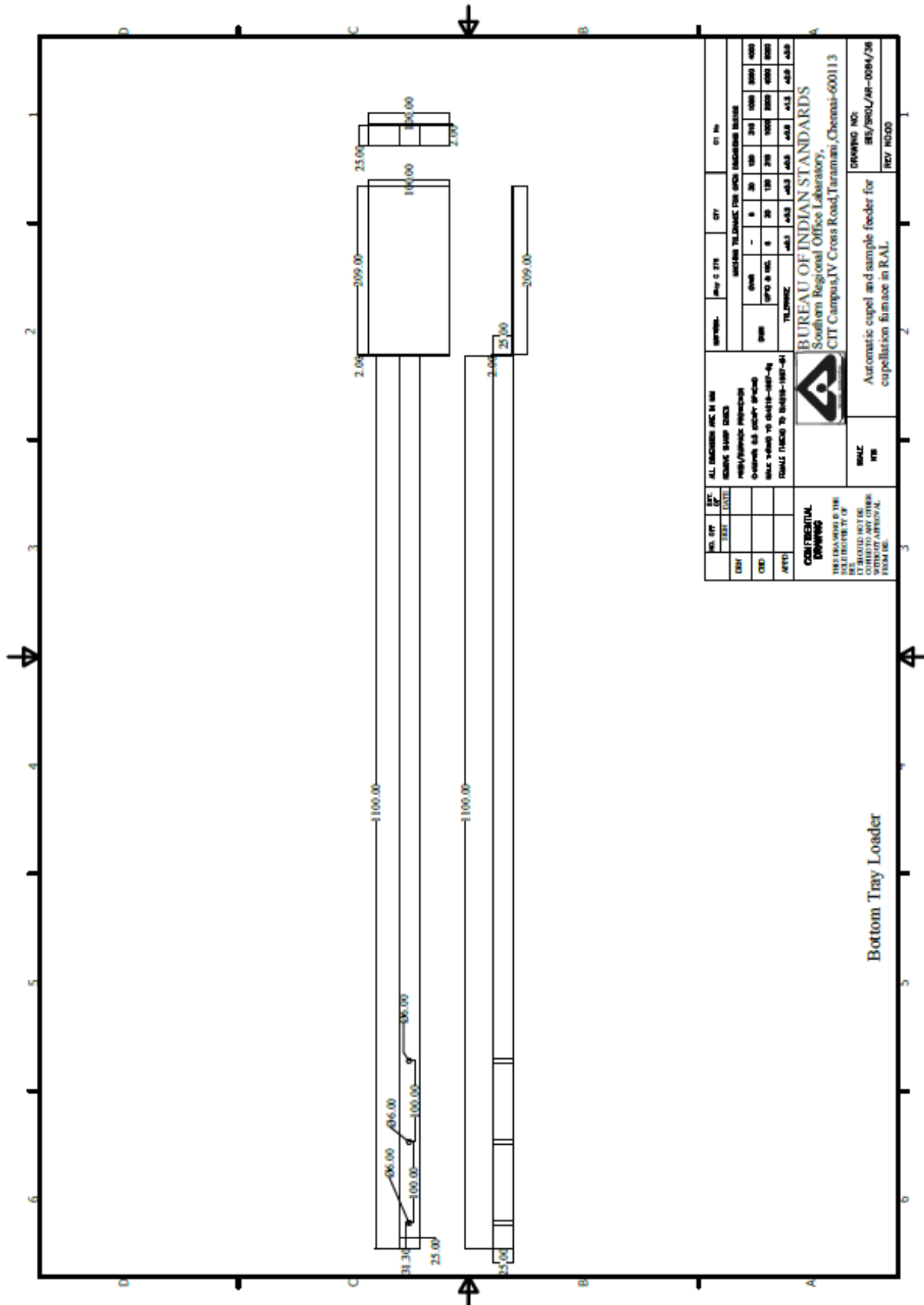


NO. OF SHEETS	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET	REV. SHEET
ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE DIMENSIONS ARE TO FACE UNLESS SPECIFIED OTHERWISE DIMENSIONS TO FACE UNLESS SPECIFIED OTHERWISE DIMENSIONS TO FACE UNLESS SPECIFIED OTHERWISE		MATERIAL: INDIAN TILAMINE FOR OPEN MAGAZINES BROOM SIZE: 155.40 x 100.00 x 25.00 QUANTITY: 1000 DATE: 15/08/2018	TITLE: Automatic cupel and sample feeder for cupellation furnace in RAL	DRAWING NO: BS/ISSC/AR-0084/04 REV: 0020					
CONFIDENTIAL THIS DRAWING IS THE PROPERTY OF BUREAU OF INDIAN STANDARDS. IT SHOULD NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT PERMISSION FROM B.I.S.			BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory, CIT Campus, IV Cross Road, Taramani, Chennai-600113			CONFIDENTIAL			



NO. OF SETS	SET OF	ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE	DATE	CITY	BY
1	1				
TITLE		INDIAN TELEPHONE FOR AUTO INSPECTION SYSTEM			
DESCRIPTION		Automatic cupel and sample feeder for cupellation furnace in RAL			
DRAWN BY					
CHECKED BY					
APPROVED BY					
CONFIDENTIAL DRAWING					
THIS DRAWING IS THE SOLE PROPERTY OF BUREAU OF INDIAN STANDARDS		SOUTHERN REGIONAL OFFICE LABORATORY, CIT Campus, IV Cross Road, Taramani, Chennai-600113			
IT SHOULD NOT BE COPIED OR REPRODUCED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION FROM THE BUREAU.		DRAWING NO: BS/SRO/AR-0064/20 REV NO:00			

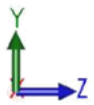
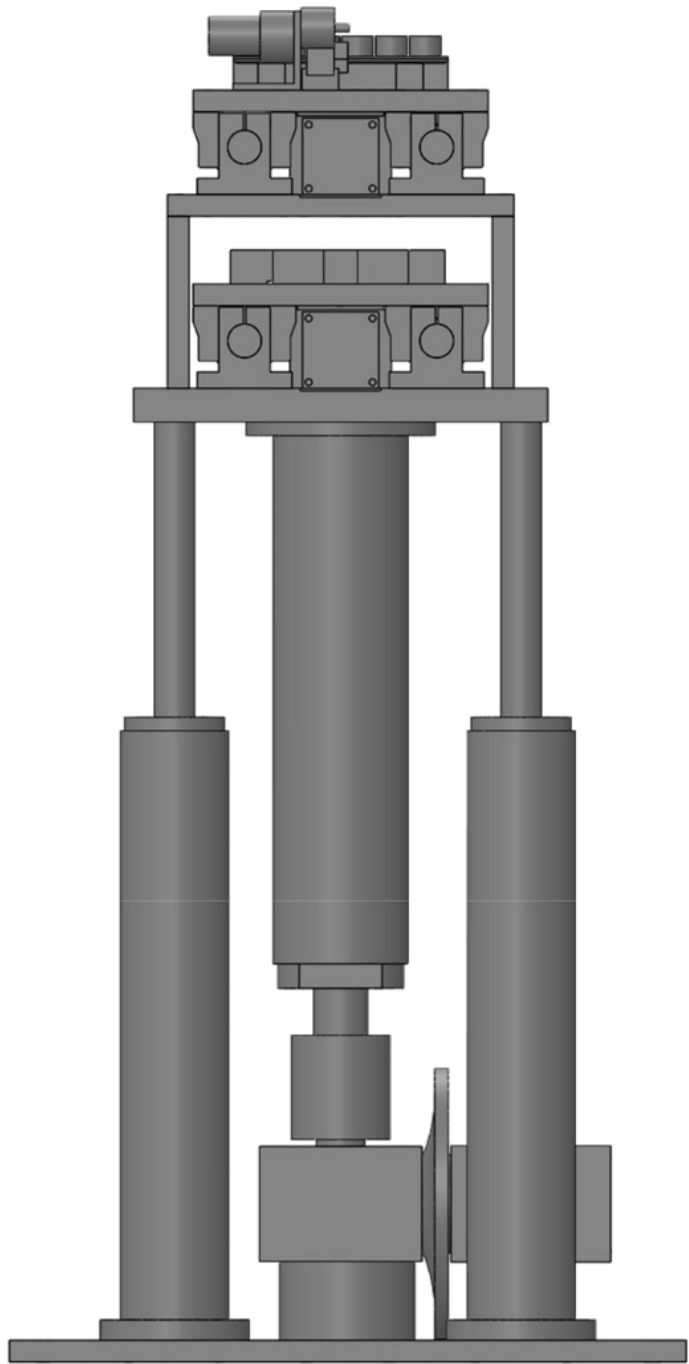
Material holding plate



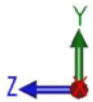
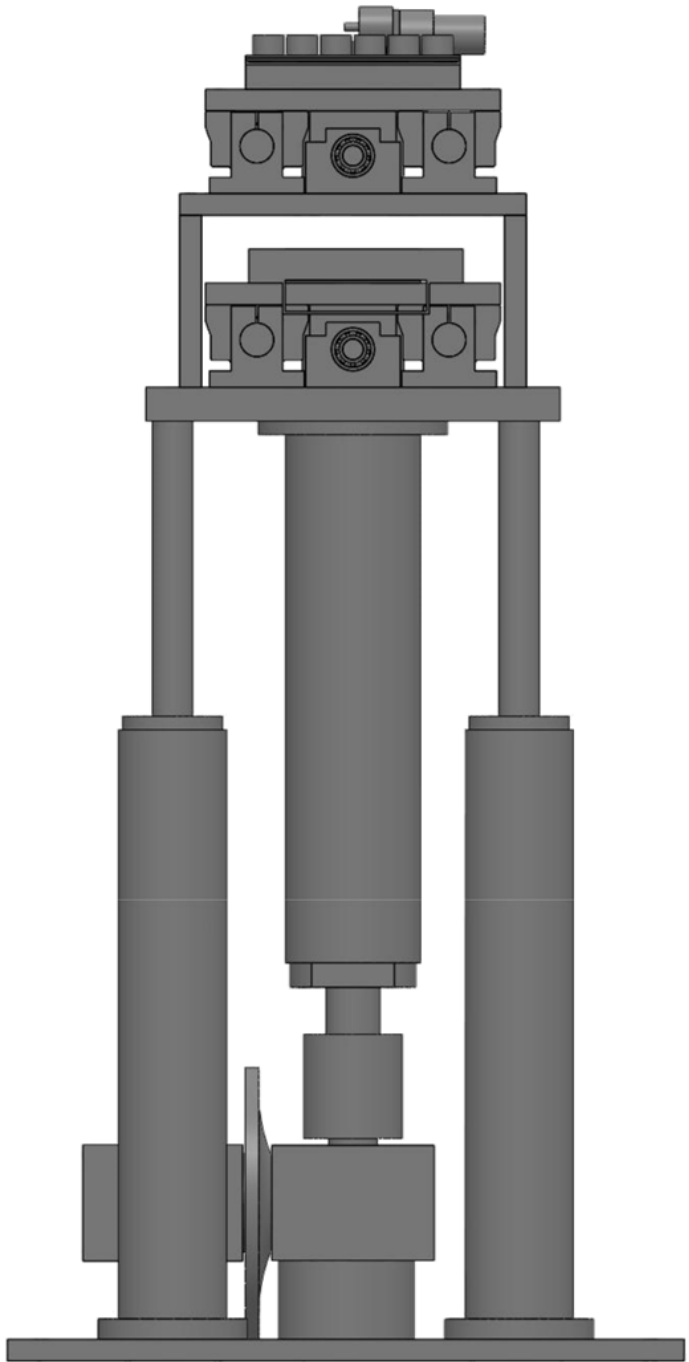
REV.	DATE	BY	CHKD.	DESCRIPTION	SCALE	DATE	BY	CHKD.	DESCRIPTION
				ALL DIMENSIONS ARE IN MM UNLESS SHOWN OTHERWISE					
				PROVIDE TOLERANCES FOR ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED					
				PROVIDE DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED					
				PROVIDE DIMENSIONS TO SURFACE UNLESS OTHERWISE SPECIFIED					
				PROVIDE DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED					
				PROVIDE DIMENSIONS TO SURFACE UNLESS OTHERWISE SPECIFIED					

CONFIDENTIAL DRAWING		BUREAU OF INDIAN STANDARDS	
THIS DRAWING IS THE PROPERTY OF		Southern Regional Office Laboratory,	
IT IS NOT TO BE REPRODUCED OR		CIT Campus, IV Cross Road, Taramani, Chennai-600113	
COPYIED IN ANY MANNER WITHOUT		DRAWING NO: BE/SROL/AR-0084/20	
WRITING PERMISSION FROM THE		REV. NO.00	

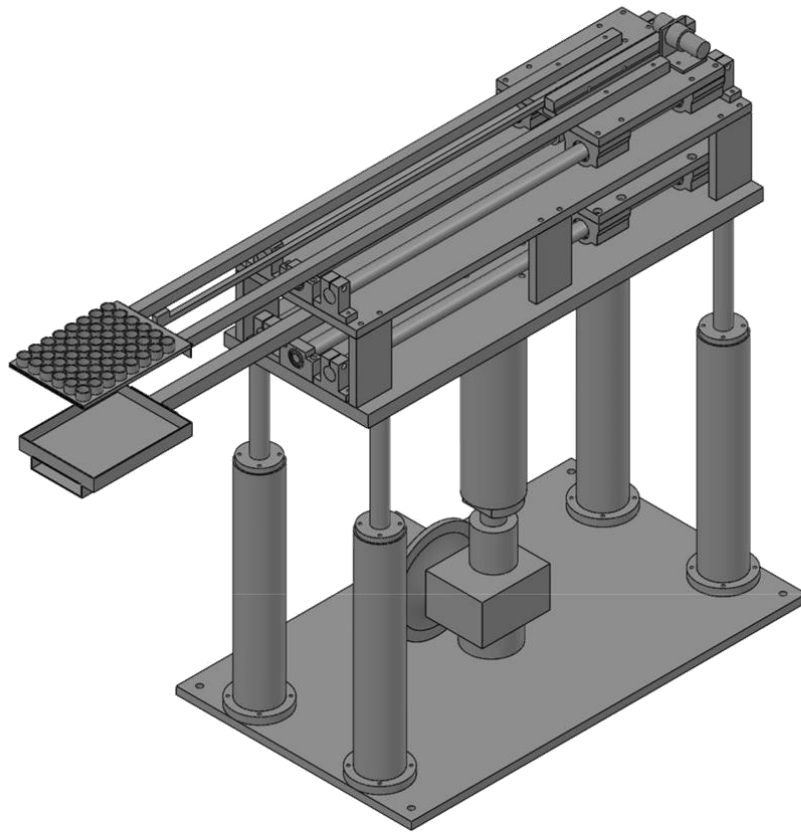
Bottom Tray Loader



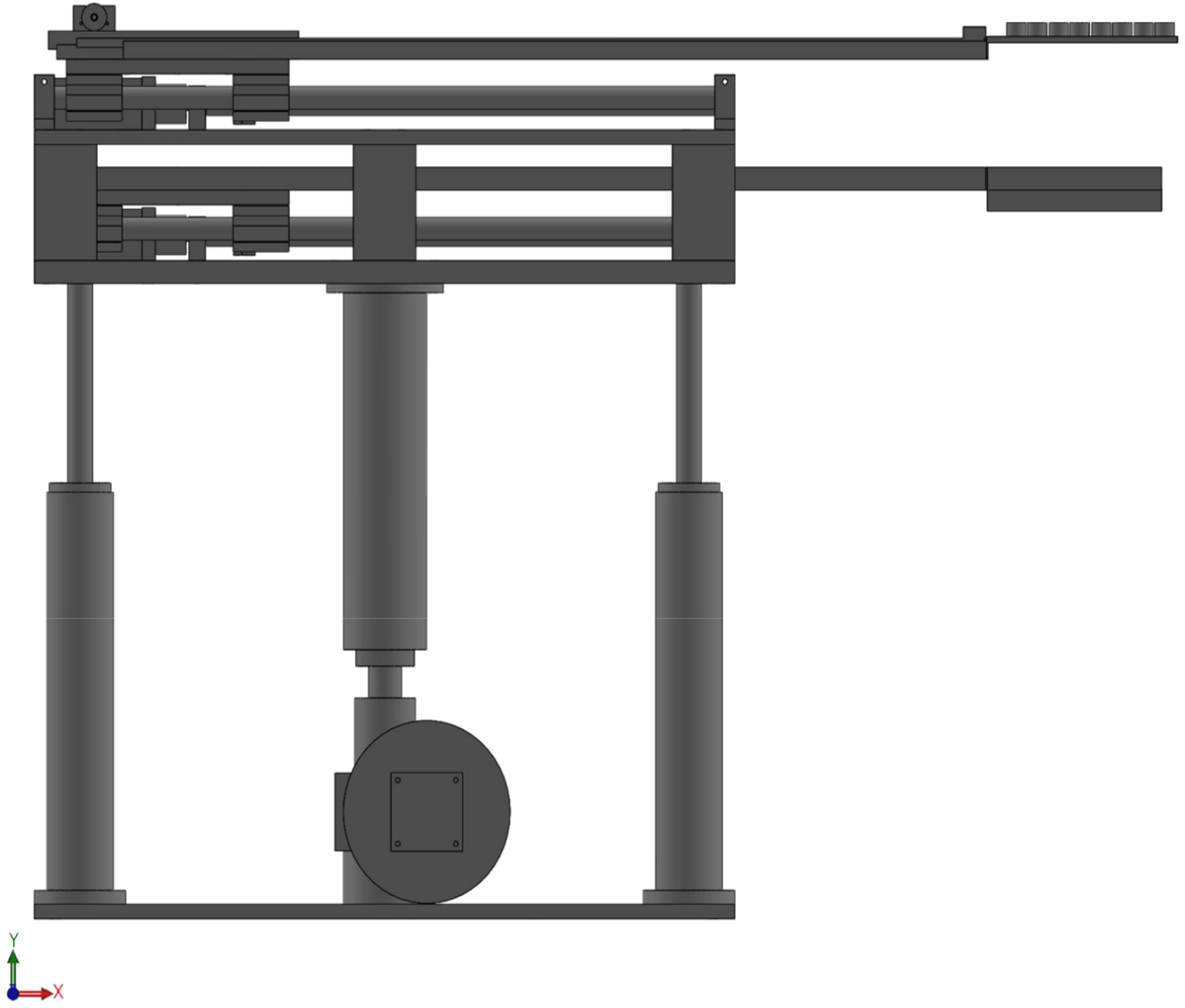
Assembly-Back



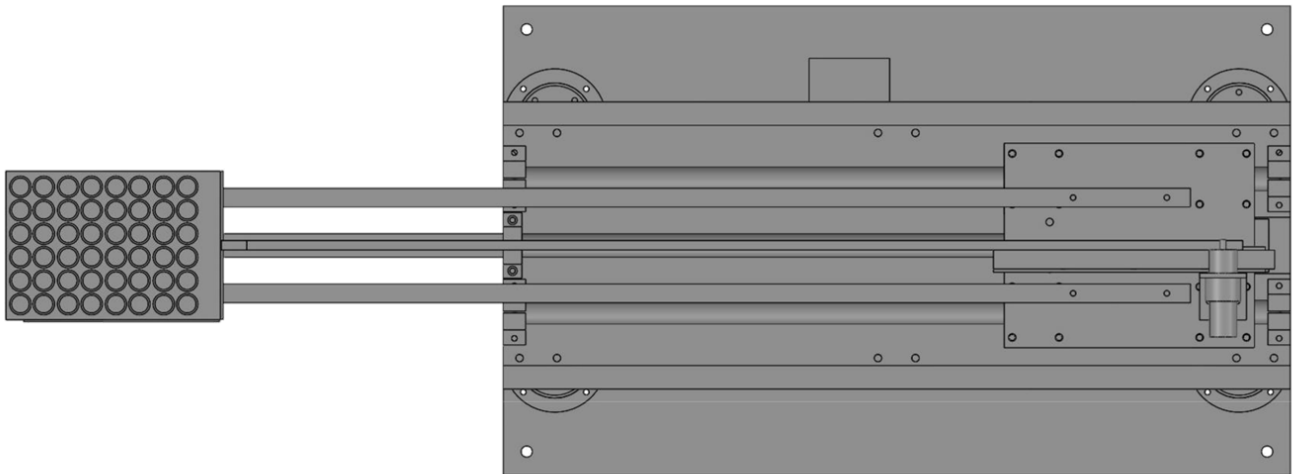
Assembly-Front



Assembly-ISO



Assembly-Side



Assembly-Top

4.4. *Selection of material for parts coming into contact with furnace*

- **Alloy C276** (A Nickel-Molybdenum-Chromium Alloy with Excellent Corrosion Resistance in both Oxidizing and Reducing Environments) - Heat exchangers, pressure vessels, tanks, evaporators, piping, flanges and fittings, pumps and valves.
- **Titanium Grade 2** (99% minimum titanium) - Titanium is light weight, exceptionally corrosion resistant and often exceeds the corrosion resistance of stainless steels in most environments. Titanium Grade 2 has good ductility, which allows for cold formability

Above two materials with high melting point and welding capability were checked by keeping them in the furnace for suitability for the purpose and it was observed that on Alloy C276 no scale was formed and hence found suitable for the purpose.

5. SUMMARY AND CONCLUSIONS

The present practice, proposed improvement and its advantages are as follows:

5.1 Feeding of Cuples

Present practice	Placing Magnesia Cupels into Cupellation furnace manually with help of tong. Four cupels are placed one by one and adjusted in the furnace so that there is no gap between four cupels.
Proposed improvement	Providing automatic feeding mechanism for simultaneous feeding of all cupels in the furnace.
Advantages	<ul style="list-style-type: none">(i) Time required for feeding all cupels (four Nos.) simultaneously through automatic feeding mechanism will be equivalent to time required for manual feeding of one cupel, thereby reducing the time to $1/4^{\text{th}}$ of the manual cupel feeding.(ii) Simultaneous feeding may enable feeding of more number of cupels (up to eight) in same time (Figure 13)(iii) The furnace door shall remain open for less duration and hence exposure of testing personnel to high temperature shall be reduced.

5.2 Feeding of Assay and the Proof Assay samples

Present practice	Placing the Assay and the Proof Assay samples (total 24) one by one, in cavities in Magnesia cupels, which have been preheated to 1100°C in the cupellation furnace. Cupellation of total 10 samples are done at a time.
Proposed improvement	Providing Automatic mechanism for simultaneous feeding of all Assay and the Proof Assay samples in to Cupellation furnace.
Advantages	<ul style="list-style-type: none"> (i) Time required for feeding all Assay and the Proof Assay (24 samples) simultaneously through automatic feeding mechanism will be approximately equal to time required for manual feeding of one sample, thereby reducing the time to approximately $1/24^{\text{th}}$ of the manual sample feeding. (ii) Simultaneous feeding may enable feeding of more number of Assay and the Proof Assay samples [20 Assay samples in duplicate (20 x 2) and 4 Proof Assay samples in duplicate (4 x 2) for 8 Cupels]. Therefore, cupellation of total 20 number of assay samples may be carried out simultaneously. (iii) The furnace door shall remain open for less duration and hence exposure of testing personnel to high temperature and toxic fumes shall be considerably reduced.

5.3 Removal of Cuples

Present practice	Removing the cupels from the furnace in the same manner in which it was placed in the furnace. Allowing the precious metal buttons to cool down before lifting them from the cupels with the assay pliers.
Proposed improvement	Simultaneous removal of all cupels from the furnace and allowing the precious metal buttons to cool down before lifting them from the cupels with the assay pliers.
Advantages	Simultaneous removal of cupels requires less time and thus the duration of exposure to high temperature and toxic fumes will be reduced.

From above mentioned advantages, it may be concluded that the Automatic feeding mechanism will achieve the aim in terms of safety, ease in operation and also in enhancing testing capacity.

5.4 Benefits to stakeholders

BIS

Testing personnel	:	Safety & ease of operation
RAL	:	Enhanced Testing Capacity (up to 1.5 times)
Standard Formulation	:	Standard Formulation : The equipment may be referred for guidance purpose in IS 15820: 2009 (General requirements for Competence of Assaying and Hall marking Centres)

A & H Centres

Presently A & H centres are receiving 2-3 lots in day for Hallmarking from which 2-3 samples are tested as per sampling plan. After Hallmarking becoming mandatory more samples will be required to be tested and the time equipment will enable them for enhanced testing capacity.

All

Power saving (6-7 units per batch)

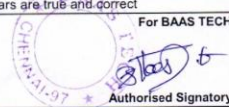
6. RECOMMENDATIONS

The design/drawing may be used for fabrication of the equipment and use in RAL of BIS.

The equipment may be referred for guidance purpose in IS 15820: 2009 (General requirements for Competence of Assaying and Hall marking Centres)

7. DETAILS OF THE BIS SUPPORT AVAILED WITH JUSTIFICATION, BILLS/VOUCHERS, ETC., AS RELEVANT

For Designing of Automatic Cupel & Sample Feeder for Cupellation Furnace in RAL, drawings were also required, for which services of outside agency were taken. Total 31 drawings were got prepared, which includes drawing for complete set up and different components. Total expenditure was Rs. 14986/- (Rs. Fourteen thousand nine hundred eighty six only) on this account. Copy of bill is given below.

GST INVOICE							
BAAS TECH No 5 & 6, Temple Town Kunrathur, Chennai - 600 069 Email: info@baastech.com / baastech.chennai@gmail.com OUR GSTIN 33AFCPB1918H1Z2 STATE Tamil Nadu STATE CODE 33						Invoice No. 050 Date 21.12.2020 Reverse Charge (Y/N) No Transportation Mode Veh. No Date & Time of Supply Place of Supply Supplier's Ref.	
Billing Address				Shipping Address			
M/s BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory CIT Campus, IV Cross Road, Taramani Chennai-600113 State Tamil Nadu State Code 33 GSTIN No. 33AAATB0431G2ZH				M/s BUREAU OF INDIAN STANDARDS Southern Regional Office Laboratory CIT Campus, IV Cross Road, Taramani Chennai-600113 State Tamil Nadu State Code 33 GSTIN No. 33AAATB0431G2ZH			
PURCHASE ORDER No.: SROL/3/6/2020				DATE: 27.11.2020			
S.No	PRODUCT DESCRIPTION	HSN/SAC CODE	GST RATE	QTY	RATE	PER	AMOUNT
1	Charges for preparation of drawing for Automatic Cupel and Sample feeder for Cupellation Furnace in (RAL LAB)	4911	18%	1	Rs. 12,700.00	NOS	Rs. 12,700.00
COMPANY'S BANK DETAILS					Total Amount Before Tax		
Bank Name INDIAN OVERSEAS BANK					Rs. 12,700.00		
A/c Number 009833000000021					Add : CGST 6% Rs. 762.00		
Type of Account Cash Credit (CC)					Add : SGST 6% Rs. 762.00		
IFS Code IOBA0000098					Add : IGST 0% Rs. 0.00		
Branch Triplicane					Packing & Forwarding Rs. 0.00		
Indian Rupees					Transport Rs. 0.00		
Fourteen Thousand Two Hundred and Twenty Four only					Rounded Off Rs. 0.00		
					Invoice Total 14224.00		
					GST On Reverse Charge		
We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct							
RECEIVED THE ABOVE GOODS IN GOOD CONDITION				For BAAS TECH			
Customer's Signature & Seal							

Sc. F & HSRGL Dy. No. 3119
Dated: 23/12/2020

HSRL
DIC(RAL)



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

Doc. No. : PRTD/AR/PF:04	Issue No. : 1	Issue Date 28 Apr 2020	DECLARATION OF ORIGINAL WORK
-----------------------------	------------------	---------------------------	-------------------------------------

DECLARATION OF ORIGINAL WORK

I, **Arvind Prakash Dhar Dwivedi, Scientist E & Head (SROL)**, Employee No. **062588** hereby declare that the Action Research Project titled “**Designing of Automatic Cupel & Sample Feeder for Cupellation Furnace in RAL**” is the original research work done by me. I have not copied from any other Action Research Project or any other work of similar nature and topic done by any person/institution/body either published or yet to be published. Data and information from other sources, used if any, have been with prior permission, wherever required and is duly acknowledged appropriately in the project report submitted by me.

This declaration is made on the 12th day of February 2021.

(A.P.D. Dwivedi)
Sc. E & Head (SROL)