

DRAWING NO:

200

SCALE X,
refer Note No. 12
& 15

35

60° 65° 70° 75°

100

30

$\phi 50$

ENGRAVING/PUNCHING LOCATION

$\phi 1.5$

Hole1

.07 .07 .08

15

35

R100

SCALE Y,
refer Note No.13 & 15

BOTTOM

BOTTOM

300

FRONT

SCALE Z,
refer Note No. 14 & 15

35° 40° 45° 50° 55°

TOP

BACK

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	AMIT KUMAR PRAJAPAT		06.09.19	
CHD	DILIP KUMAR SINGH		06.09.19	
REV	DEEPESH V		06.09.19	
APPD	R ARULPRABHU		06.09.19	

DEPT NC	GRADE OF UNTO. DIM
CODE 150	C/M/F



	SCALE
--	-------

WEIGHT (Kg)	
-------------	--

REF TO ASSY / OLD DWG

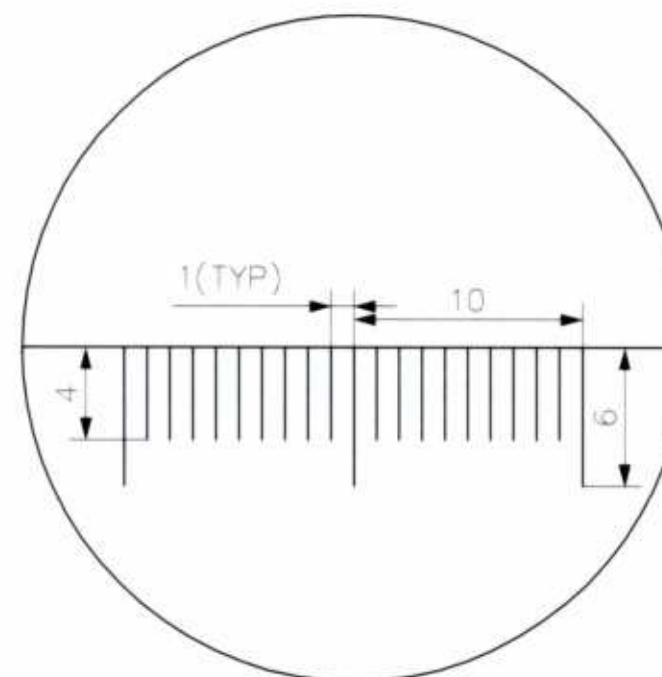
ITEM NO	No OF ITEMS
---------	-------------

TITLE	IIW-V1 REFERENCE BLOCK
-------	------------------------

CARD
CODE
U 01

DRAWING NO :	REV
3-93-171-05471	00

Size A3



Detail – A

For Notes refer drawing No. 3-93-171-05521

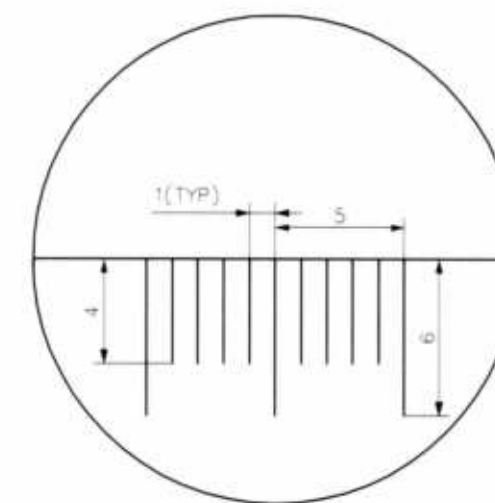
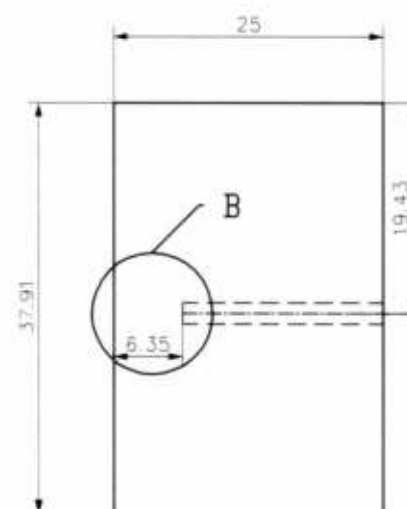
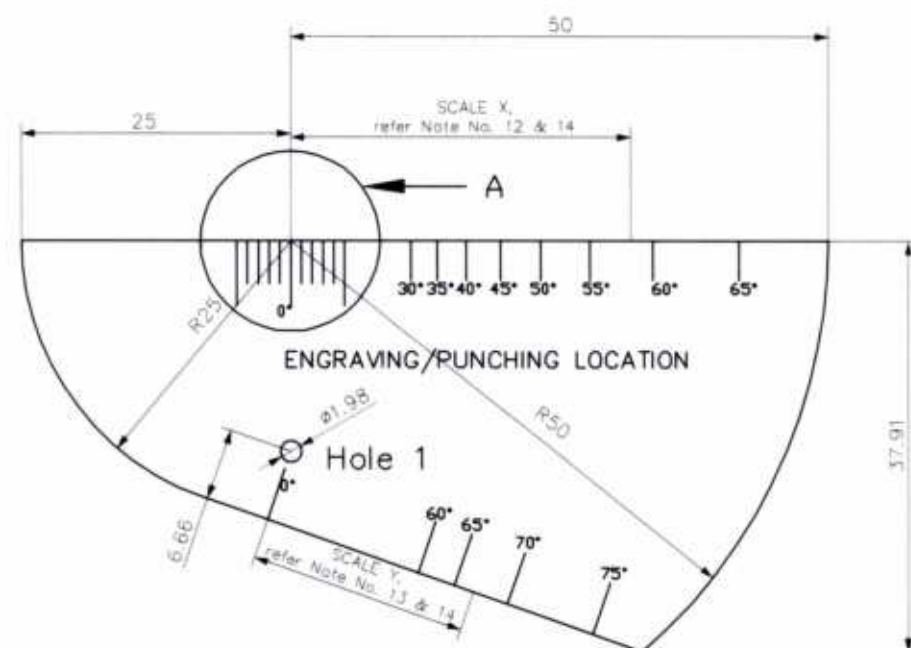
Block No.: BHEL-ATP-NPC-001

[illegible]

3-93-171-05472

DRAWING NO:

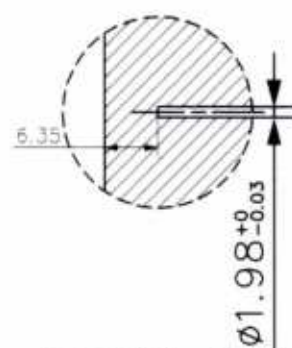
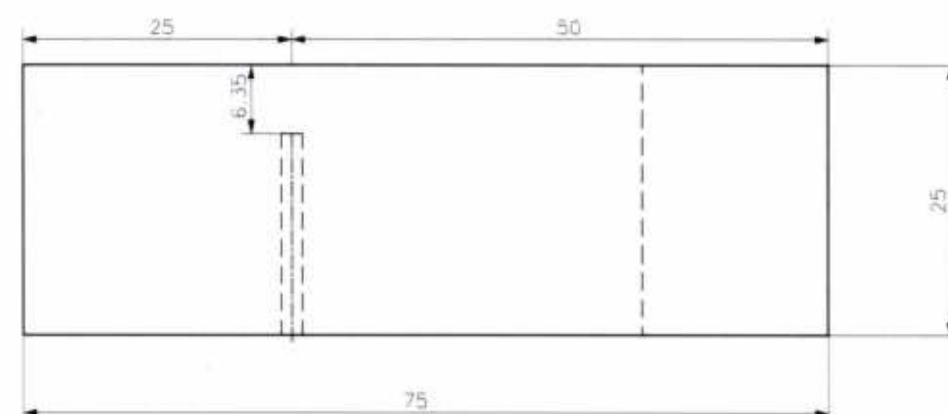
ALL DIMENSIONS ARE IN MILLIMETERS



Detail - A

For Notes refer drawing No. 3-93-171-05522

Block No.: BHEL-ATP-NPC-002



DETAIL-B

(FBH, refer Note No. 17 & 18)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT WEIGHT	NO. OF ITEMS
		PLATE 25X38X75				20 MnMoNi 55		
					VAR NO	MATERIAL SPECN	QUANTITY	

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

NAME	SIGNATURE	DATE	NO. OF VAR
DRN AMIT KUMAR PRAJAPAT		06.09.19	
CHD DILIP KUMAR SINGH		06.09.19	
REV DEEPESH V		06.09.19	
APPD R. ARULPRABHU		06.09.19	

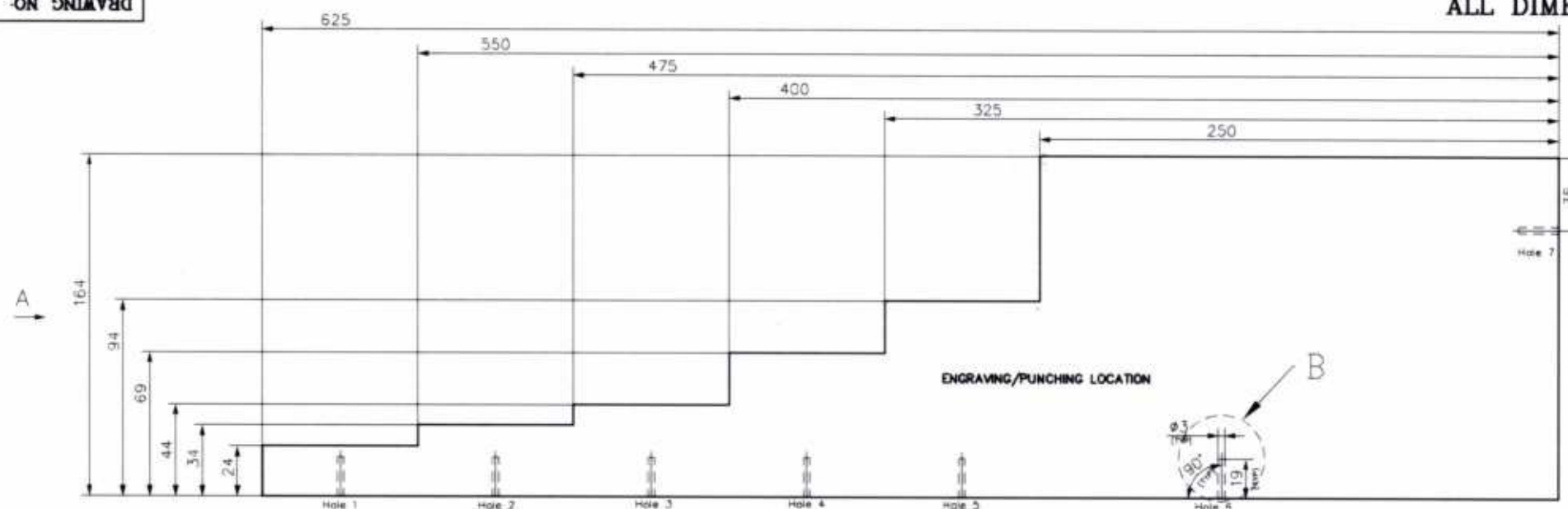
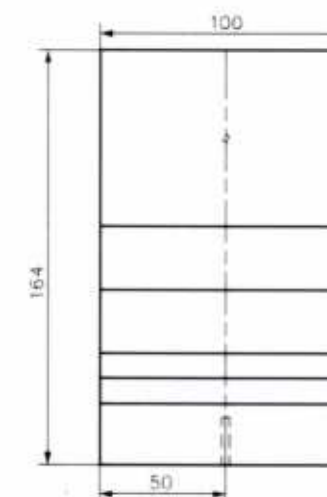
DEPT	GRADE OF UNTOLO DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
NC	C/M/F					
CODE 150						
TITLE	CARD CODE	DRAWING NO :	REV			
IIW V2 CALIBRATION BLOCK	U 01	3-93-171-05472	00			

Size A3

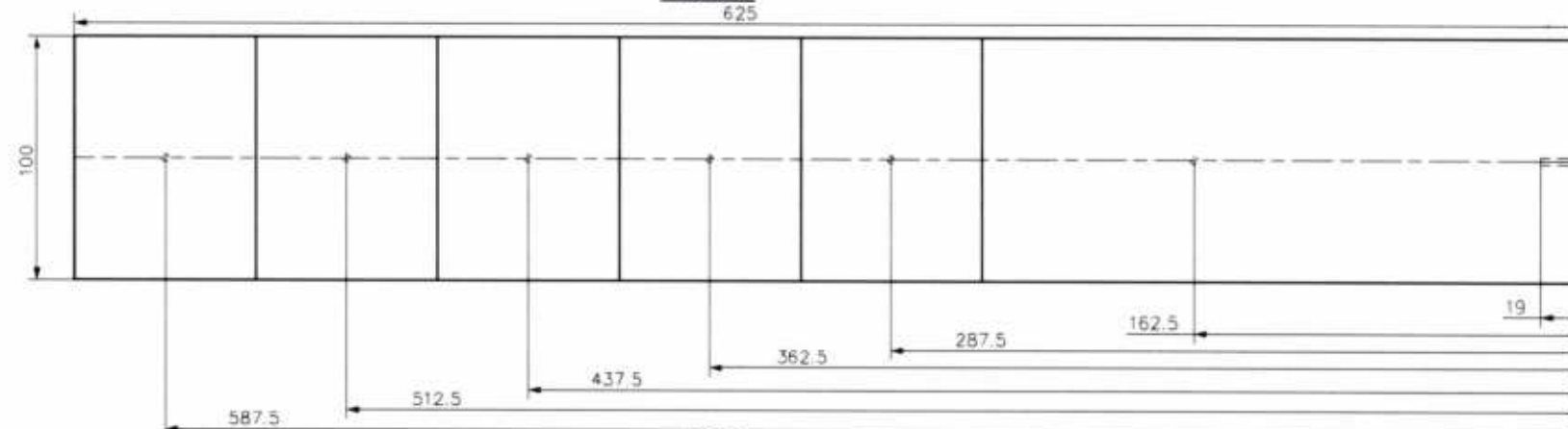
3-93-171-05478

DRAWING NO.

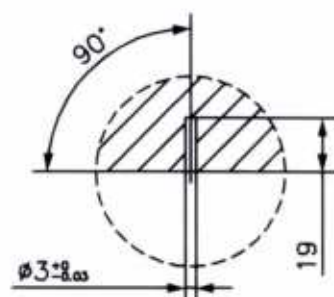
ALL DIMENSIONS ARE IN MILLIMETERS

FRONT
625

VIEW-A



TOP



DETAIL-B

(TYP Hole 1 to 7)

For Notes refer drawing No. 3-93-171-05520

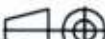
Block No.: BHEL-ATP-NPC-008

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160

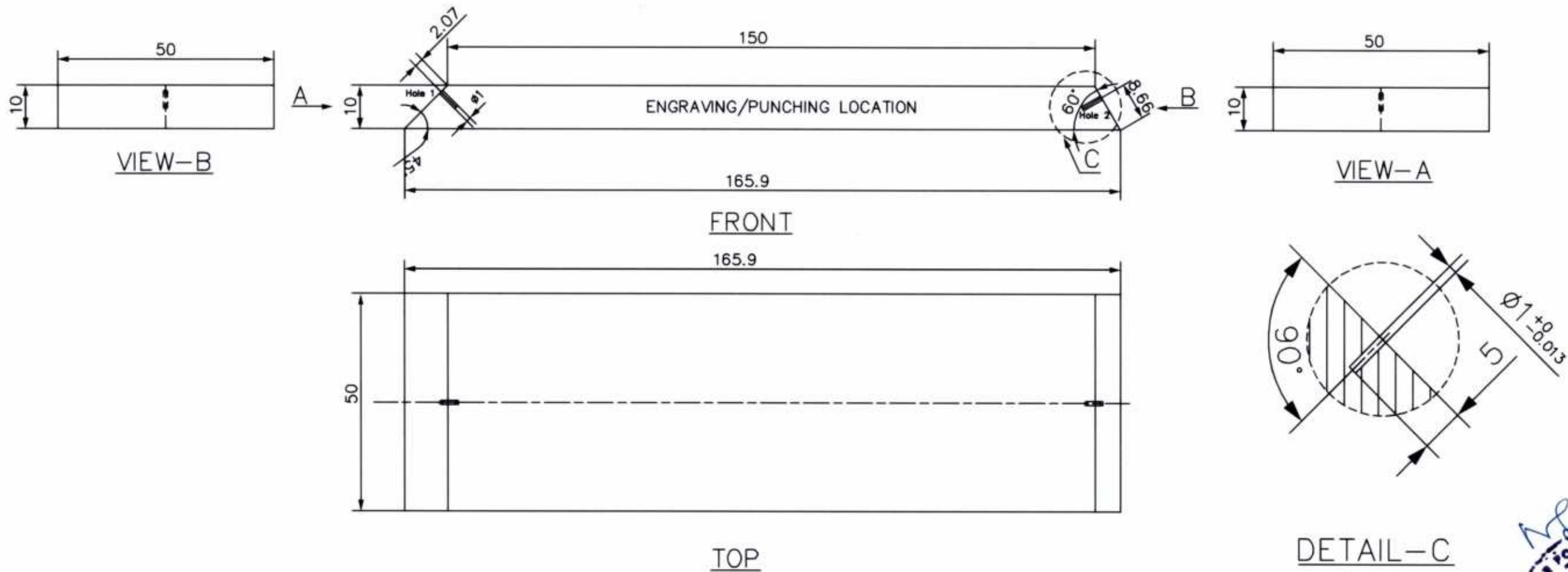
 06-229/D	Bharat Heavy Electricals Ltd			DRN	NAME	SIGNATURE	DATE	NO. OF VAR	
	UNIT: HIGH PRESSURE BOILER PLANT			CHD	NAME	SIGNATURE	DATE		
	TIRUCHIRAPALLI - 620014			REV	NAME	SIGNATURE	DATE		
				APPD	NAME	SIGNATURE	DATE		
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG			ITEM NO	No OF ITEMS
CODE 150									
TITLE				CARD CODE U 01	DRAWING NO :			REV	
NORMAL FBH REFERENCE BLOCK ABOVE 40mm					3-93-171-05478			00	



Size A3

3-93-171-05479
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



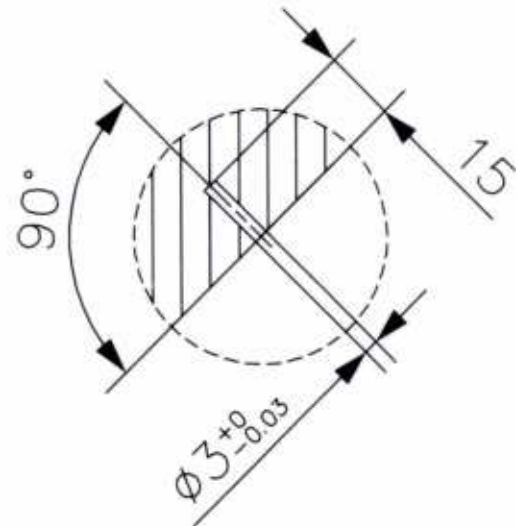
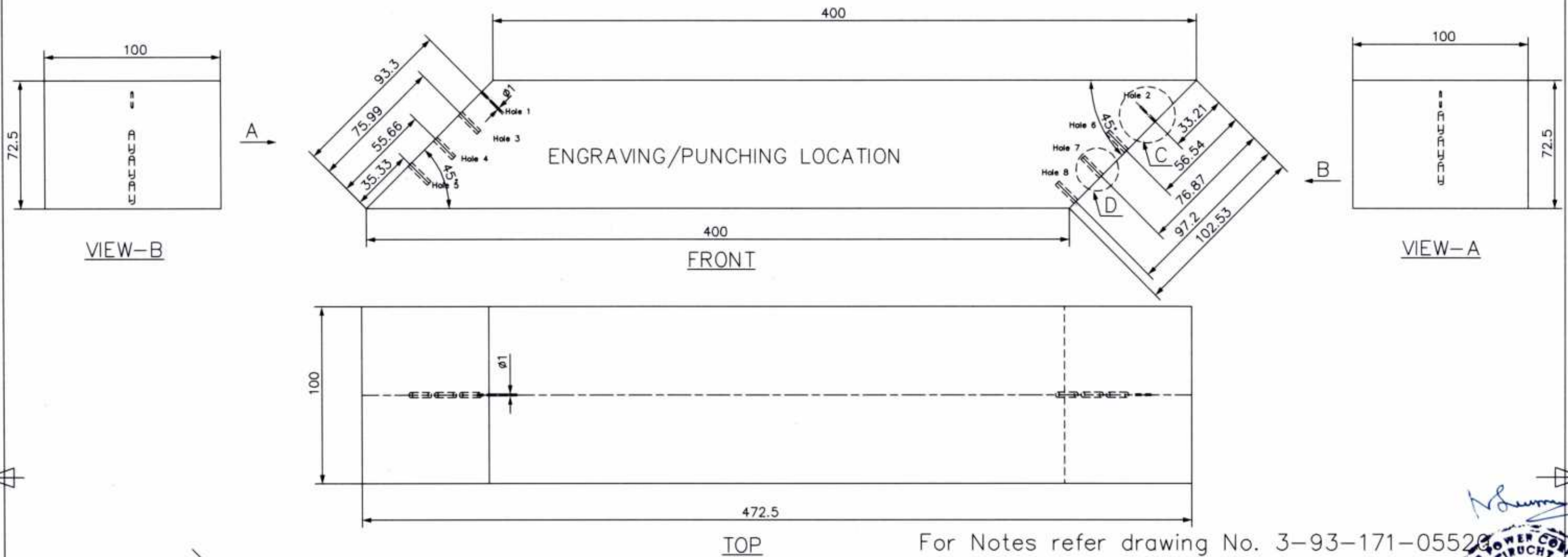
For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-009

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	VAR NO	MATERIAL SPECN	UNIT	QUANTITY
		PLATE 10X50X165.9				20MnMoN155				

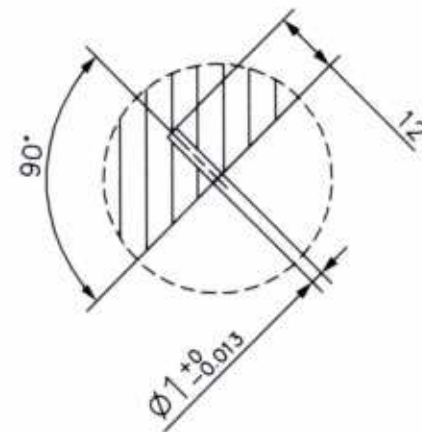
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160	
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME	SIGNATURE	DATE
05-229/D		CHD	AMIT KUMAR PRAJAPAT		06.09.19
		REV	DILIP KUMAR SINGH		06.09.19
		APPD	DEEPESH V		06.09.19
			R. ARULPRABHU		06.09.19
DEPT	GRADE OF UNTOLO. DOM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO
NC	C/M/F			SA11	
CODE					
150					
TITLE			CARD CODE	DRAWING NO :	REV
TUBE SHEET FE-BUTTERING 45° & 60° Reference Block for SA11			U 01	3-93-171-05479 00	

Size A3



DETAIL-D

(For hole no.- 3 to 8)



DETAIL-C

(For hole no.- 1 and 2)

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT
NC
CODE
150

GRADE OF
UNTOL DIM
C/M/F



SCALE

WEIGHT (Kg)

REF TO ASSY / OLD DWG

SA11

ITEM
NO

No OF
ITEMS

TITLE

FE-BUTTERING ON SHELL+57.5mm CIRSEAMS
45° Reference Block for SA11 & SA12A

CARD
CODE
U 01

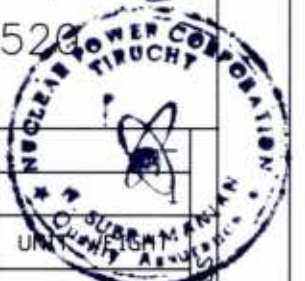
DRAWING NO :

3-93-171-05480 00

REV

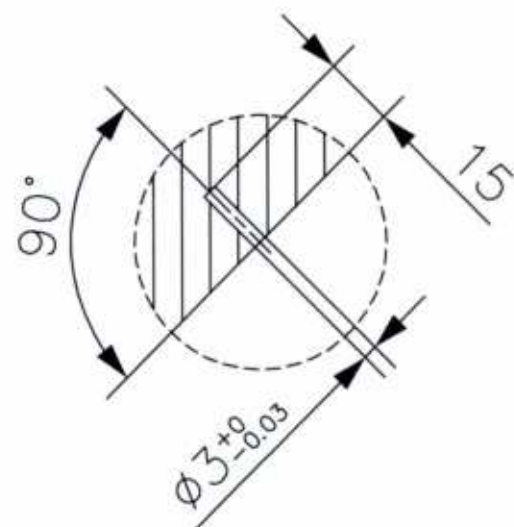
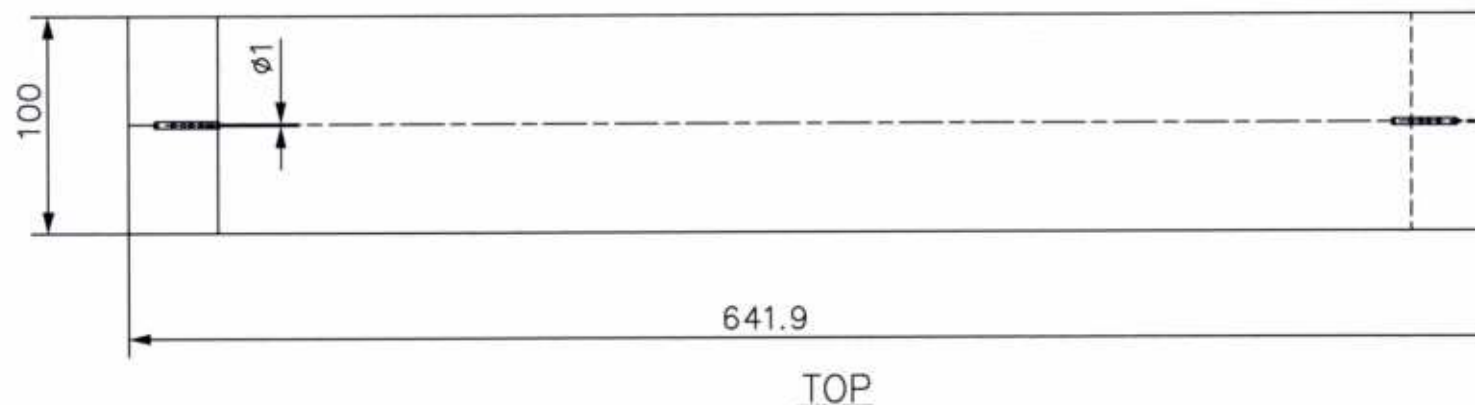
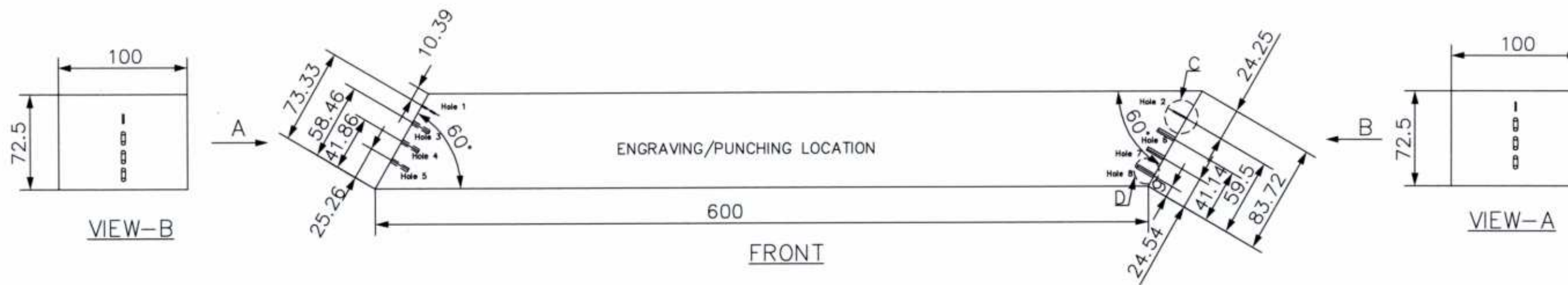
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	VAR NO	MATERIAL SPECN	A/C	UNIT	UNIT	QUANTITY
		PLATE 73X100X473				20MnMoNi55			A			

For Notes refer drawing No. 3-93-171-05520
Block No.: BHEL-ATP-NPC-010

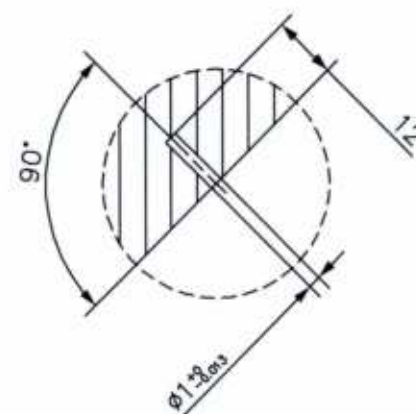


3-93-171-05481
DRAWING NO:

ALL DIMENSIONS ARE IN MILLIMETERS



DETAIL-D
(For Hole No.- 3 to 8)



DETAIL-C
(For Hole no.- 1 and 2)

For Notes refer drawing No. 3-93-171-05520
Block No.: BHEL-ATP-NPC-011

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	VAR NO	MATERIAL SPECN	A/C	UNIT	WEIGHT	QUANTITY
		PLATE 73X100X643				20MnMoN155						

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160										
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR						
		CHD	DILIP KUMAR SINGH		06.09.19							
		REV	DEEPESH V		06.09.19							
		APPD	R ARULPRABHU		06.09.19							
DEPT	NC	GRADE OF UNTOL DIM	C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS				
CODE	150					SA11						
TITLE							CARD CODE	DRAWING NO :		REV		
FE-BUTTERING ON SHELL+57.5mm CIRSEAMS 60° Reference Block for SA11 & SA12A							U 01	3-93-171-05481		00		

REV	DATE	ALTERED :
		CHD&APPD :

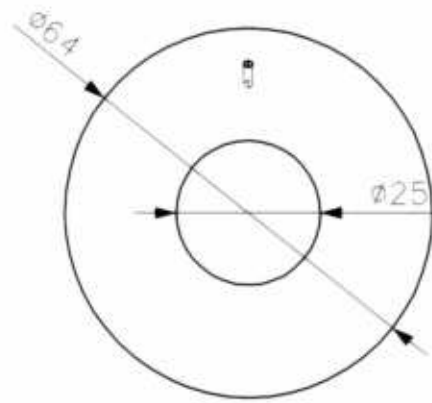
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3-93-171-05482

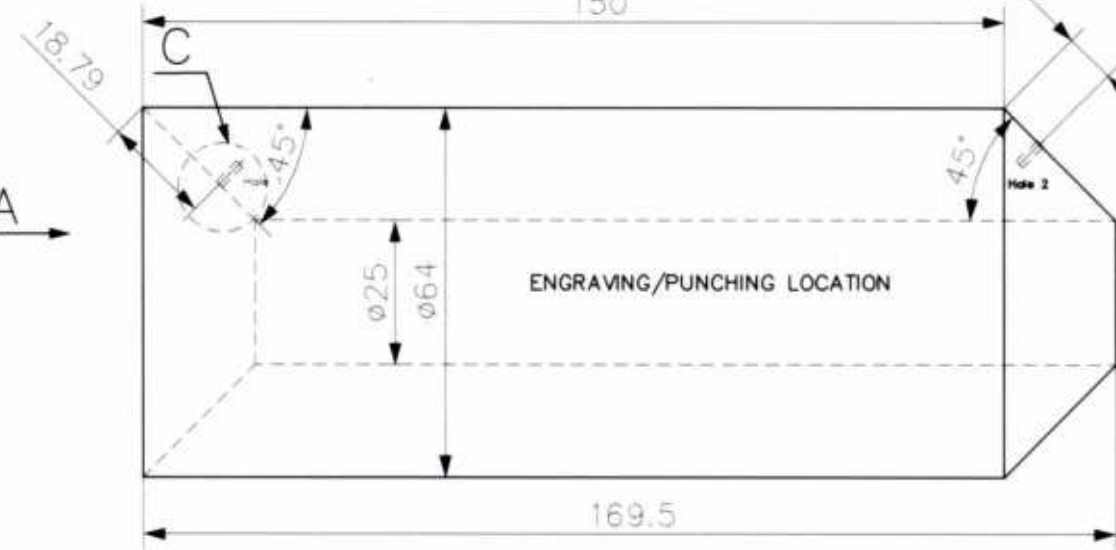
DRAWING NO:

ALL DIMENSIONS ARE IN MILLIMETERS



VIEW-B

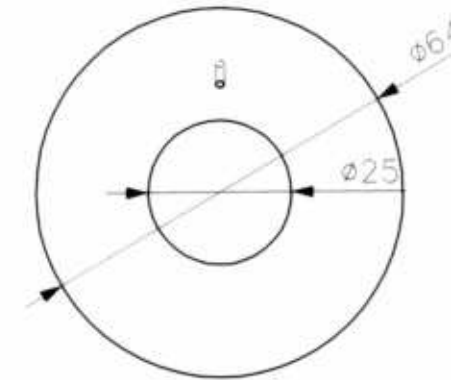
A



ENGRAVING/PUNCHING LOCATION

FRONT

B

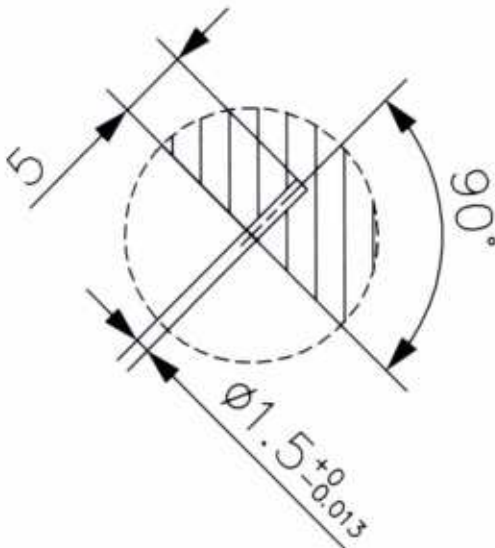


VIEW-A



TOP

For Notes refer drawing No. 3-93-171-05520
Block No.: BHEL-ATP-NPC-012

DETAIL-C
(TYP)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	QUANTITY
		ROD ø64 . T19. 5mm. 170LG				16Mo3	A	
					VAR NO	MATERIAL SPECN	A/C	DI

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT
NC
CODE
150

GRADE OF
UNTOL. DIM
C/M/F



SCALE

WEIGHT (Kg)

REF TO ASSY / OLD DWG

SA11

ITEM NO

No OF
ITEMS

TITLE

LT, PR & TM NOZZLE
45° Reference Block for SA11, SA12 & SA13

CARD
CODE
U 01

DRAWING NO :

3-93-171-05482 00

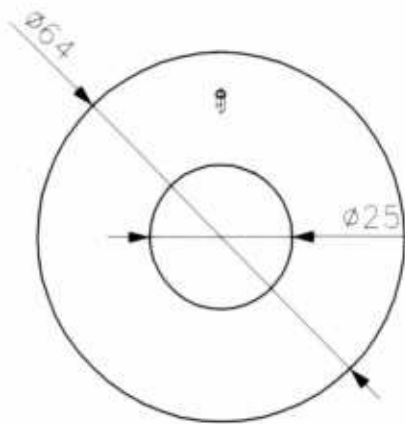
REV

Size A3

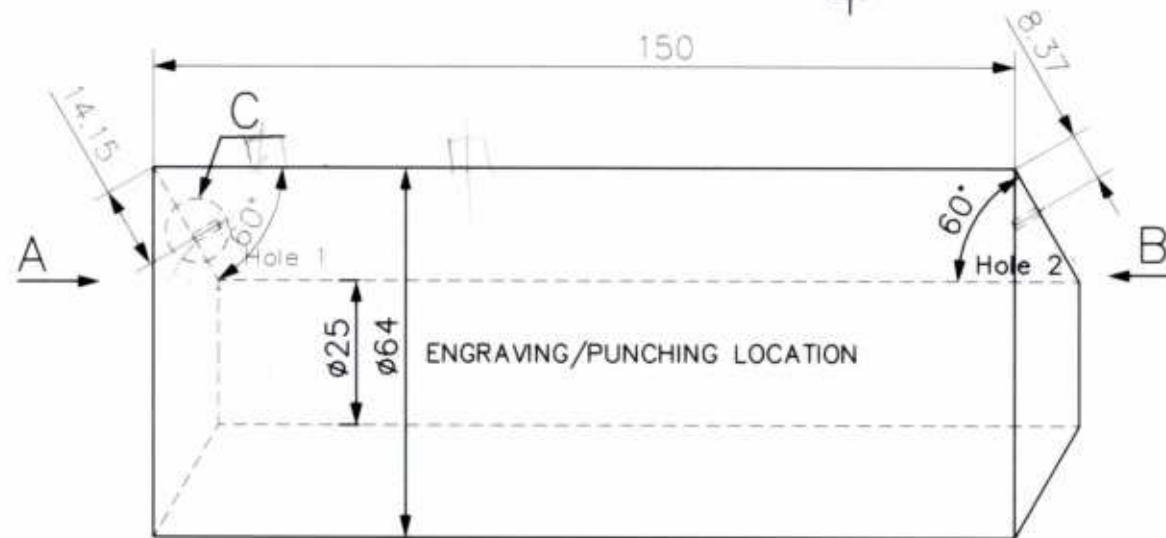
3-93-171-05483

DRAWING NO:

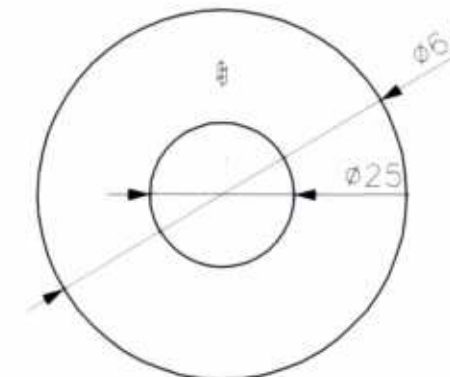
ALL DIMENSIONS ARE IN MILLIMETERS



VIEW-B



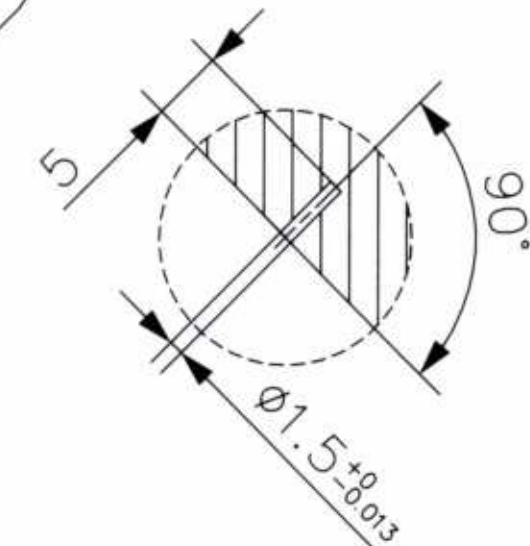
FRONT



VIEW-A



TOP



DETAIL-C

(TYP)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	QUANTITY
		ROD 64. T19. 5mm. 162LG				16Mo3	A	1
					VAR NO	MATERIAL SPECN	A/C	

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-013

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHVP-STEAM GENERATOR W.O.D157 TO D160

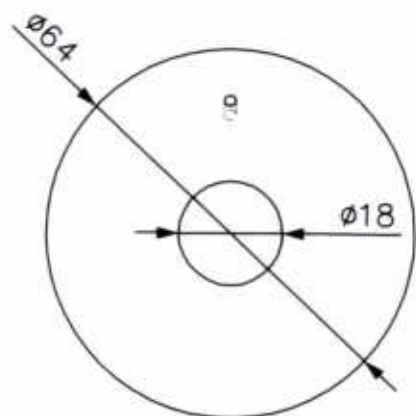
DEPT	NC	GRADE OF UNTOLO DIM	C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE	150					SA11		

TITLE	LT, PR & TM NOZZLE 60° Reference Block for SA11, SA12 & SA13	CARD CODE	U 01	DRAWING NO :	3-93-171-05483	REV	00
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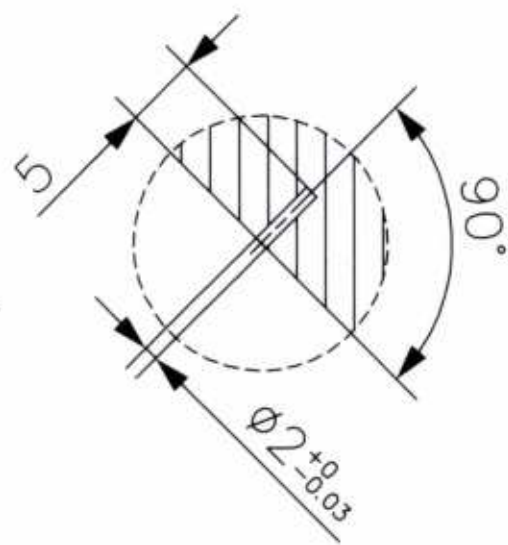
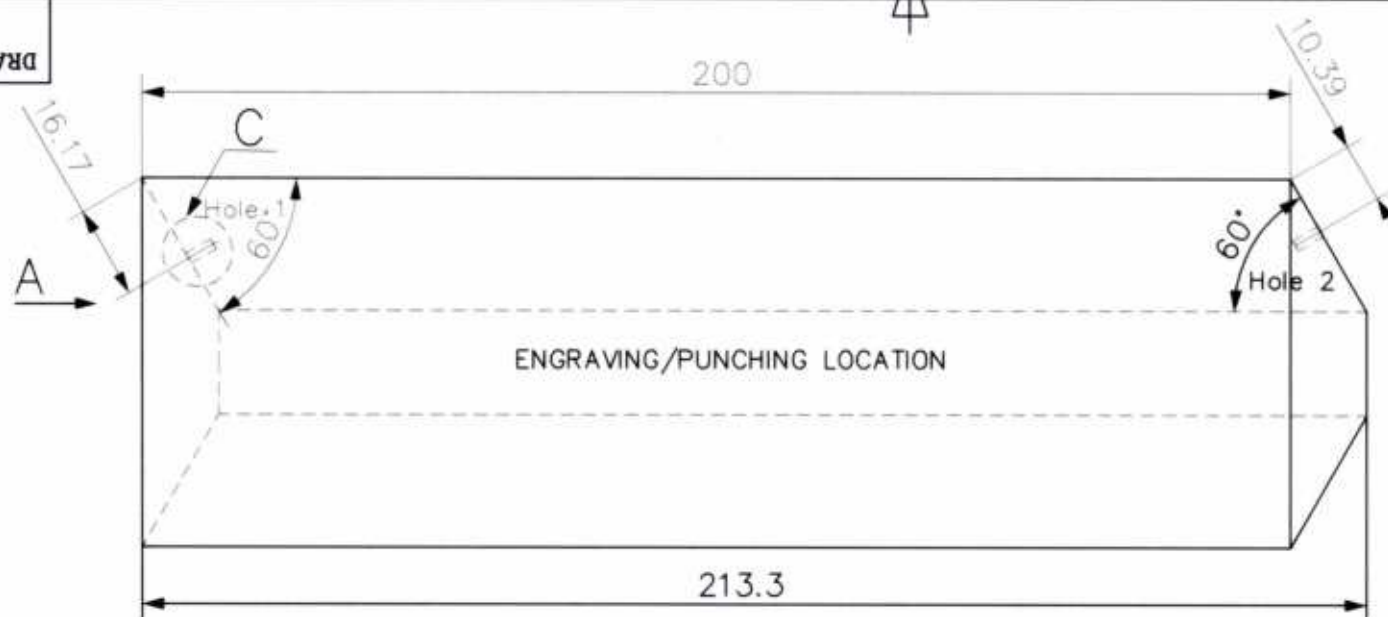
Size A3

3-93-171-05485

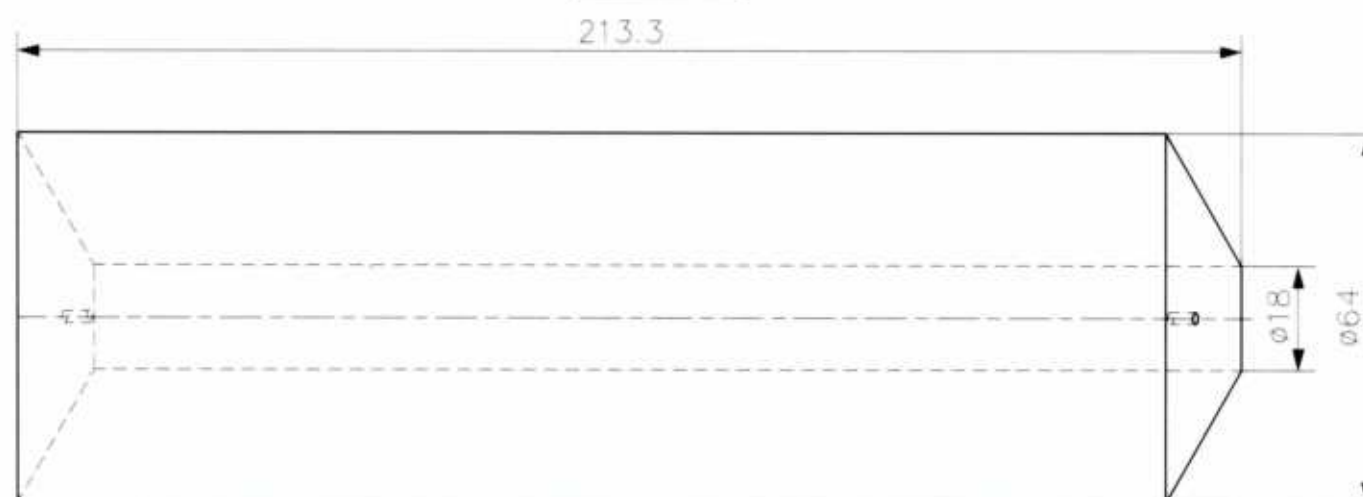
DRAWING NO:



VIEW-B

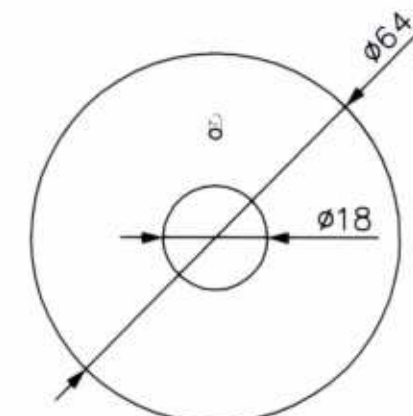
DETAIL-C
(TYP)

FRONT



TOP

ALL DIMENSIONS ARE IN MILLIMETERS



VIEW-A

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	QUANTITY
		ROD Ø64, T23mm, 214LG				16Mo3	A	1
					VAR NO	MATERIAL SPECN	D1	

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-015

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014DEPT
NC
CODE
150GRADE OF
UNTOL DIM
C/M/F

SCALE

WEIGHT (Kg)

REF TO ASSY / OLD DWG
SA11CARD
CODE
U 01DRAWING NO :
3-93-171-05485 00

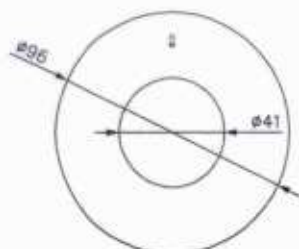
REV

Size A3

3-93-171-05486

DRAWING NO.

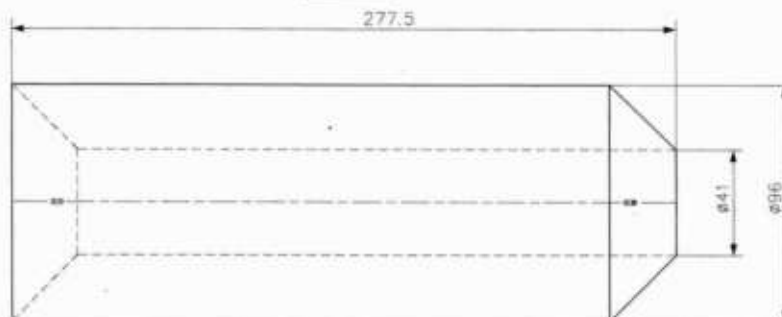
ALL DIMENSIONS ARE IN MILLIMETERS



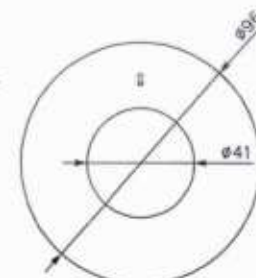
VIEW-A



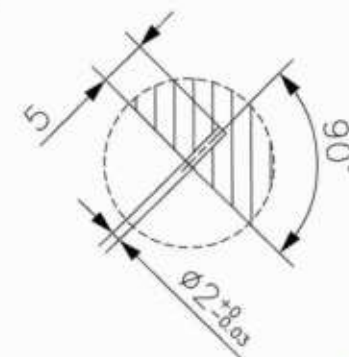
FRONT



TOP



VIEW-B



DETAIL-C
(TYP)

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-016

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	QUANTITY
		ROD 96. T27.5 mm 278LG				16Mo3	A		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHVP-STEAM GENERATOR W.O.D157 TO D160			
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014					
DEPT NC	GRADE OF MATERIAL C/M/F	SCALE	WEIGHT (Kg)	NAME RACHAVENDRIEN	DATE 08.09.21
CODE 150				SIGNATURE RACHAVENDRIEN	DATE 08.09.21
TITLE BD NOZZLE 45° Reference Block for SA11		CARD CODE U 01	DRAWING NO : 3-93-171-05486 01		

REV	DATE	ALTERED :
01	08.09.21	CHD&APPD :
DD changed to 96 ID changed to 41 due to non availability of 100 Rod		

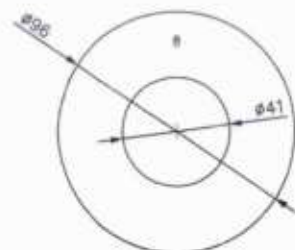
CAUTION: The information on this drawing is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

Size A3

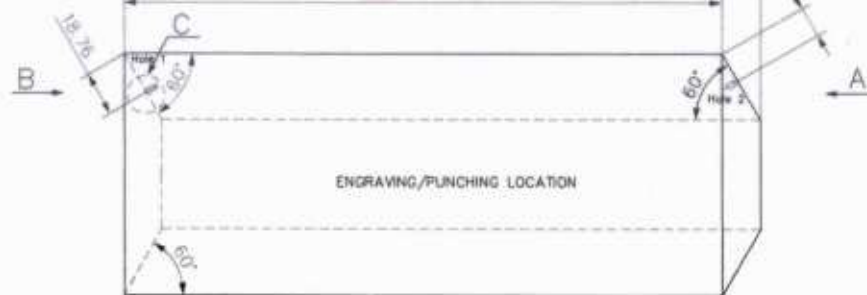
3-93-171-05487

DRAWING NO.

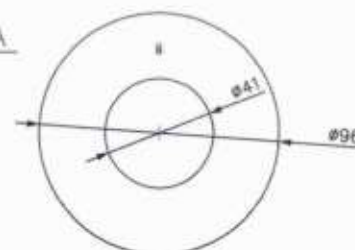
ALL DIMENSIONS ARE IN MILLIMETERS



VIEW-A



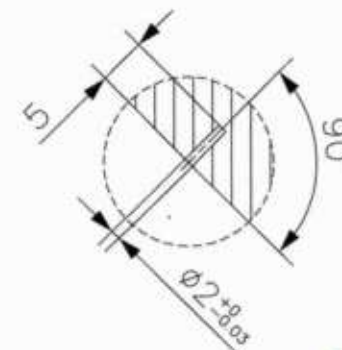
FRONT



VIEW-B



TOP

DETAIL-C
(TYP)

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-017

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT WEIGHT	VAR NO	MATERIAL SPECN	A/C	QUANTITY
		ROD Ø96. T27. 5mm. 266LG				16Mo3	A				

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT	GRADE OF UNVTOL. CDM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD	ITEM NO	NO OF ITEMS
NC	C/M/P			SA11		

TITLE
BD NOZZLE
60° Reference Block for SA11

CARD CODE
U 01
DRAWING NO :
3-93-171-05487 01
REV

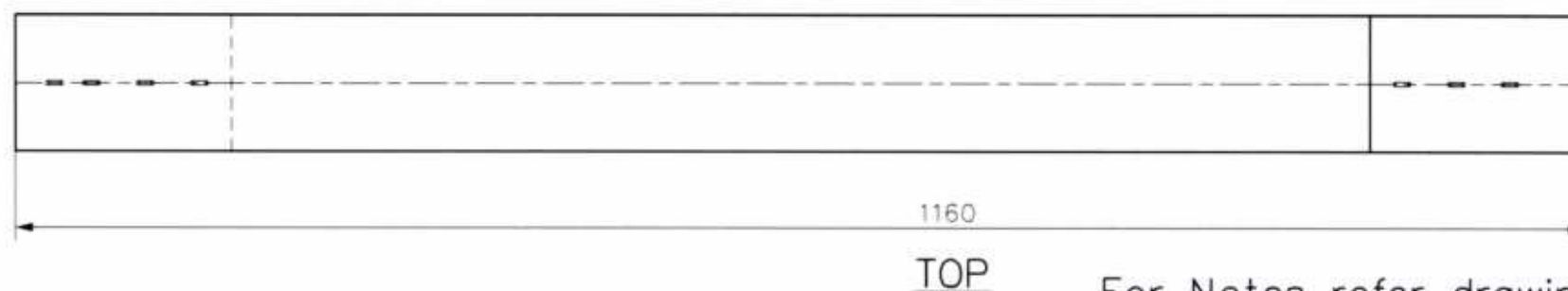
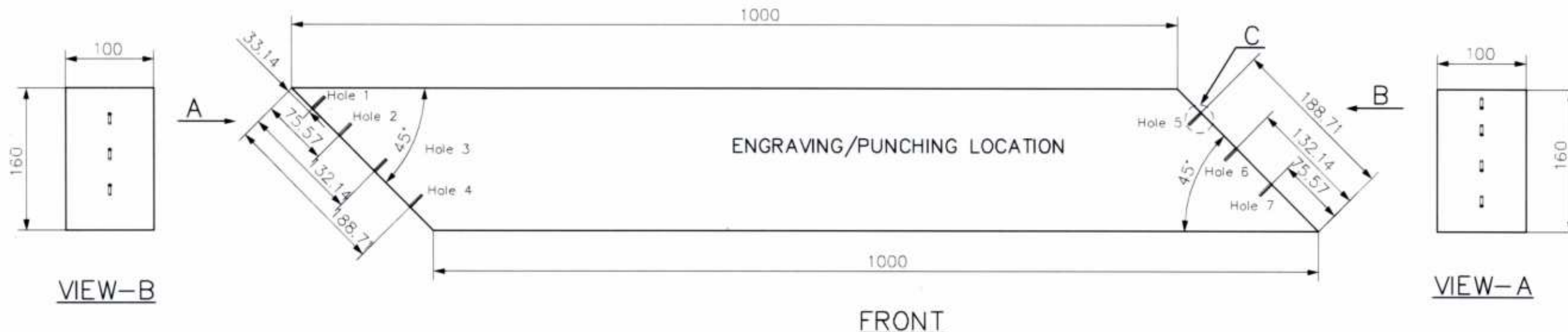
REV	DATE	ALTERED :
01	08.09.21	CHD&APPD :

DD changed to Ø96
TD changed to Ø41
Due to non availability of Ø100
ROD

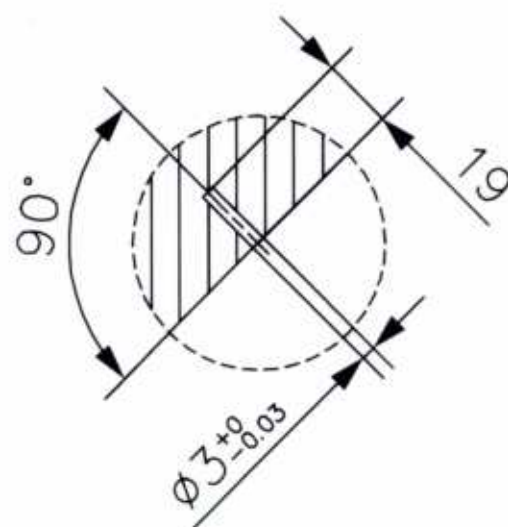
Size A3

3-93-171-05490
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05490
Block No.: BHEL-ATP-NPC-020



VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	QUANTITY
		PLATE 100X160X1160				20MnMoNi55	A	
					VAR NO	MATERIAL SPECN	D1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160			
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME	SIGNATURE	DATE
05-229/D		CHD	AMT KUMAR PRAJAPAT		06.09.19
		REV	DILIP KUMAR SINGH		06.09.19
		APPD	DEEPESH V		06.09.19
		APPD	R. ARULPRABHU		06.09.19
DEPT	GRADE OF UNTOLO DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO
NC	C/M/F			SA11	
CODE	150				
TITLE			CARD CODE	DRAWING NO :	REV
SA11 TUBE SHEET LUG 45° UT Reference Block			U 01	3-93-171-05490 00	

REV	DATE	ALTERED :
		CHD&APPD :

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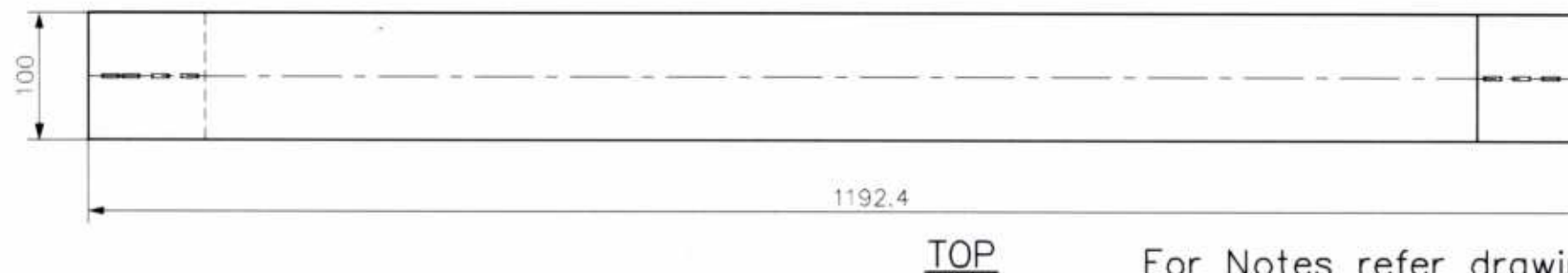
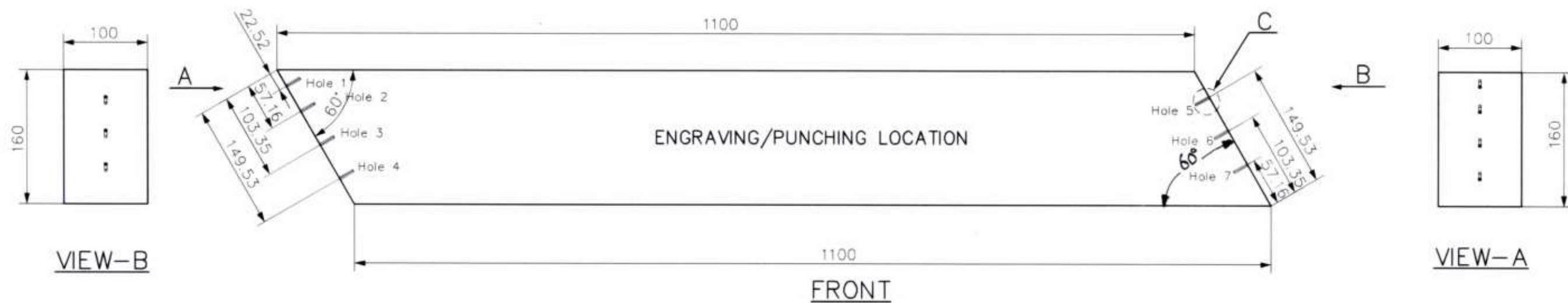


Size A3

3-93-171-05491

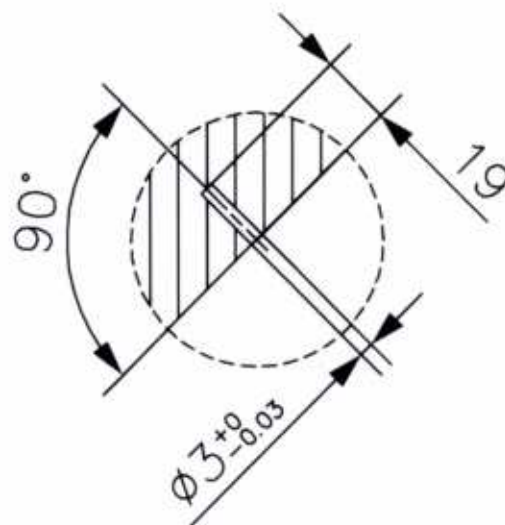
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520
Block No.: BHEL-ATP-NPC-021

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	QUANTITY
		PLATE 100X160X1193				20MnMoN155	A	1
					VAR NO	MATERIAL SPECN	D1	

DETAIL-C
(TYP)

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160

NAME	SIGNATURE	DATE	NO. OF VAR
AMIT KUMAR PRADIPAT		06.09.19	
DILIP KUMAR SINGH		06.09.19	
DEEPESH V		06.09.19	
RARULPRABHU		06.09.19	

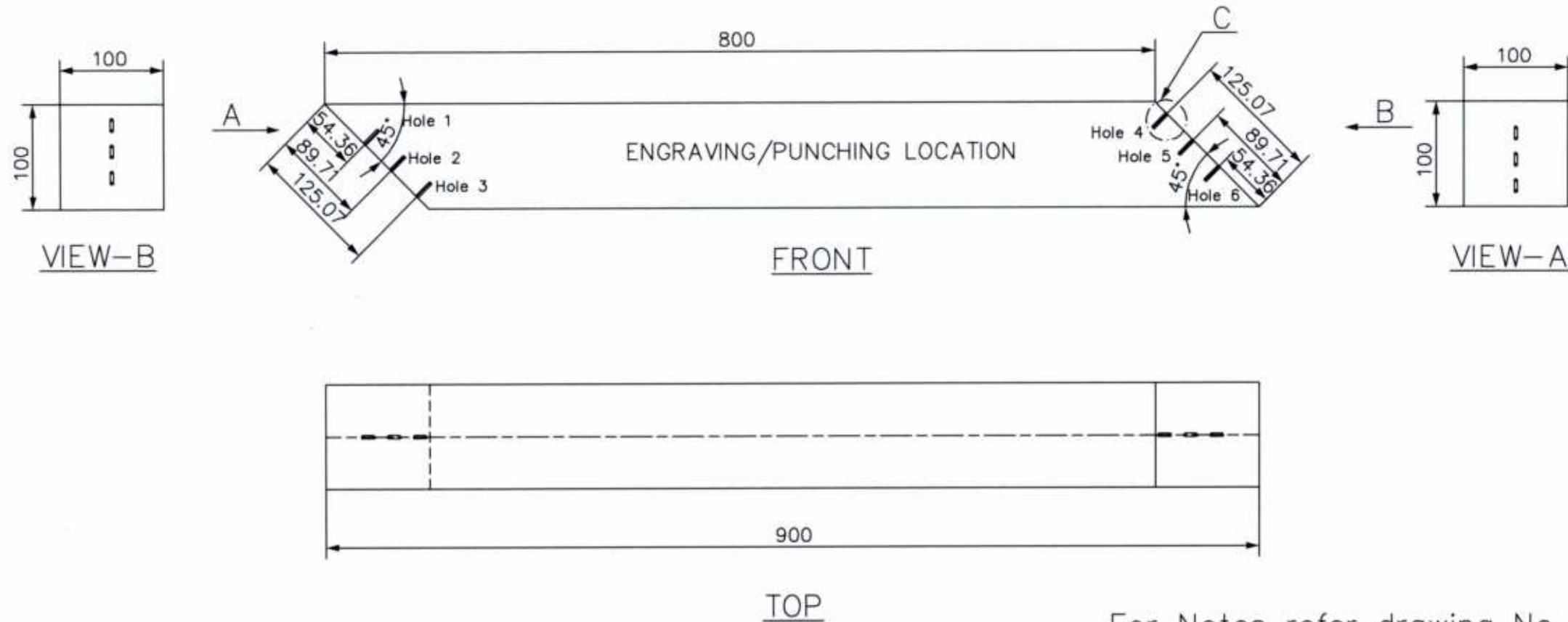
DEPT	GRADE OF UNTOLO DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
NC	C/M/F			SA11		
CODE 150						
TITLE	CARD CODE	DRAWING NO :	REV			
TUBE SHEET LUG 60°	U 01	3-93-171-05491	00			
Reference Block for SA11						

Size A3

3-93-171-05494

DRAWING NO:

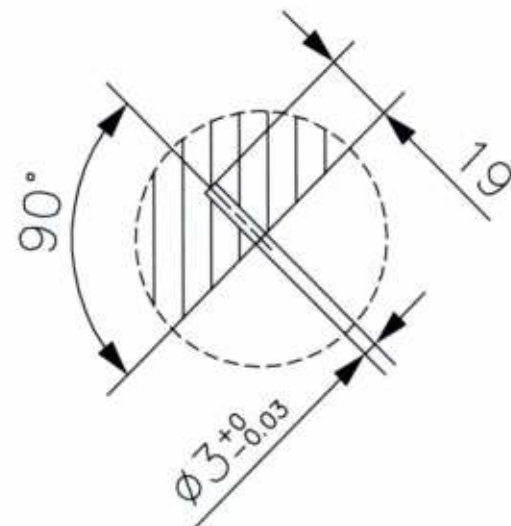
ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520

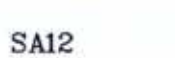
Block No.: BHEL-ATP-NPC-024

		PLATE 100X100X900						A	
					20MnMoN155				
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C	D1	
					VAR NO	MATERIAL SPECN			

DETAIL-C
(TYP)

REV	DATE	ALTERED :
		CHD&APPD :

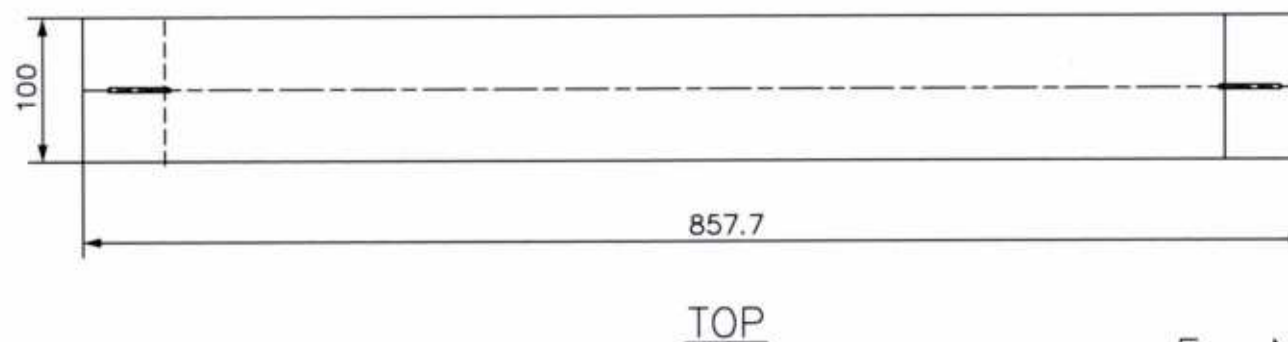
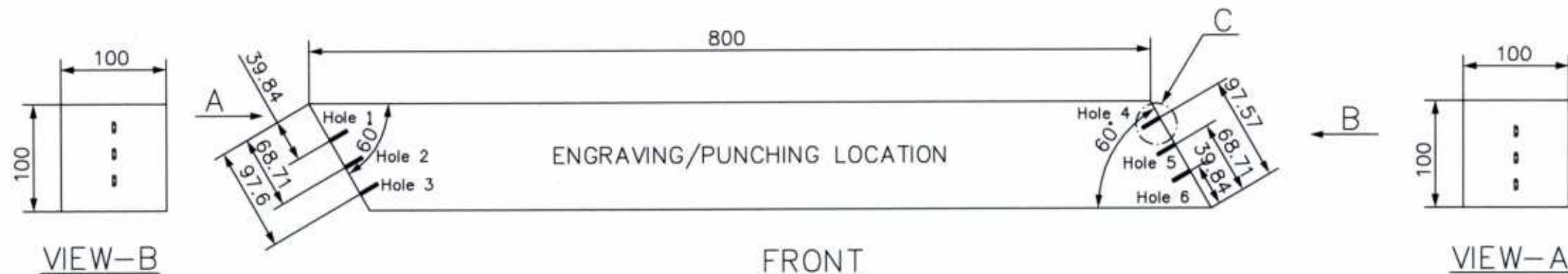
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160							
 05-229/D	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014			DRN	NAME AMIT KUMAR PRAJAPAT	SIGNATURE 	DATE 06.09.19	NO. OF VAR	
				CHD	DILIP KUMAR SINGH		06.09.19		
				REV	DEEPESH V		06.09.19		
				APPD	R.ARULPRABHU		06.09.19		
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG SA11 & SA12			ITEM NO	No OF ITEMS
CODE 150									
TITLE SA11 TUBE SHEET RIB AND SA12 TOP LUG 45° Reference Block				CARD CODE U 01	DRAWING NO : 3-93-171-05494			REV 00	

Size A3

3-93-171-05495
DRAWING NO:

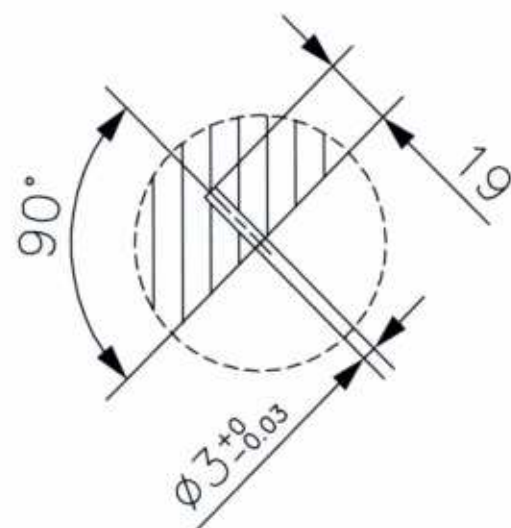
ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-025

VARIANT NUMBER	ITEM NUMBER	PLATE 100X100X858	STD	DRAWING NUMBER			A	UNIT WEIGHT QUANTITY
					20MnMoN155	1		
		DESCRIPTION			ITEM NO	MATERIAL CODE	A/C	
		VAR NO	MATERIAL SPECN	D1				



DETAIL-C
(TYP)

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DRN	NAME	SIGNATURE	DATE	NO. OF VAR
CHD	AMIT KUMAR PRAJAPAT		06.09.19	
REV	DILIP KUMAR SINGH		06.09.19	
APPD	DEEPESH V		06.09.19	
	R.ARULPRABHU		06.09.19	

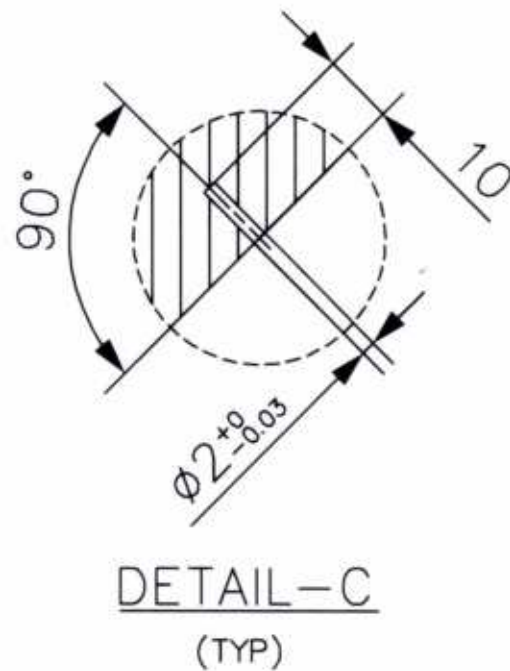
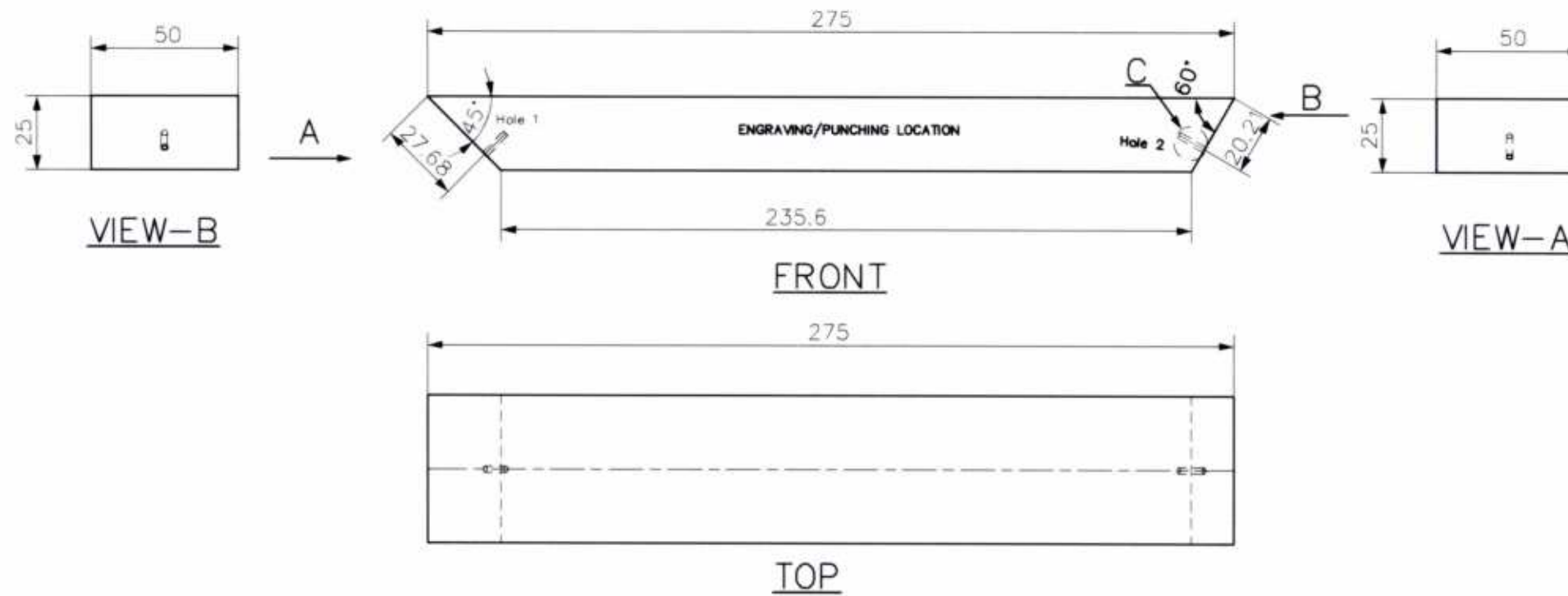
DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
NC	C/M/F			SA11		
CODE						
150						

TITLE	CARD CODE	DRAWING NO :	REV
SA11 TUBE SHEET RIB, SA12 TOP LUG AND SA13 SON + Sec HEAD 60° Reference Block	U 01	3-93-171-05495 00	

Size A3

3-93-171-05496
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-026

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	QUANTITY
		PLATE 25X50X275				16Mo3	A	1	
					VAR NO	MATERIAL SPECN	A/C	D1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160							
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRM	NAME	SIGNATURE	DATE	NO. OF VAR			
		CHD	AMT KUMAR PRAJAPAT		06.09.19				
		REV	DEEPA KUMAR SINGH		06.09.19				
		APPD	DEEPA V		06.09.19				
			R. ARULPRABHU		06.09.19				
DEPT	GRADE OF UNTOOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS			
NC	C/M/F			SA11					
CODE									
150									
TITLE				CARD CODE	DRAWING NO :	REV			
WEB PLATE ON SHELL INSIDE 45° & 60° REFERENCE BLOCK				U 01	3-93-171-05496	00			

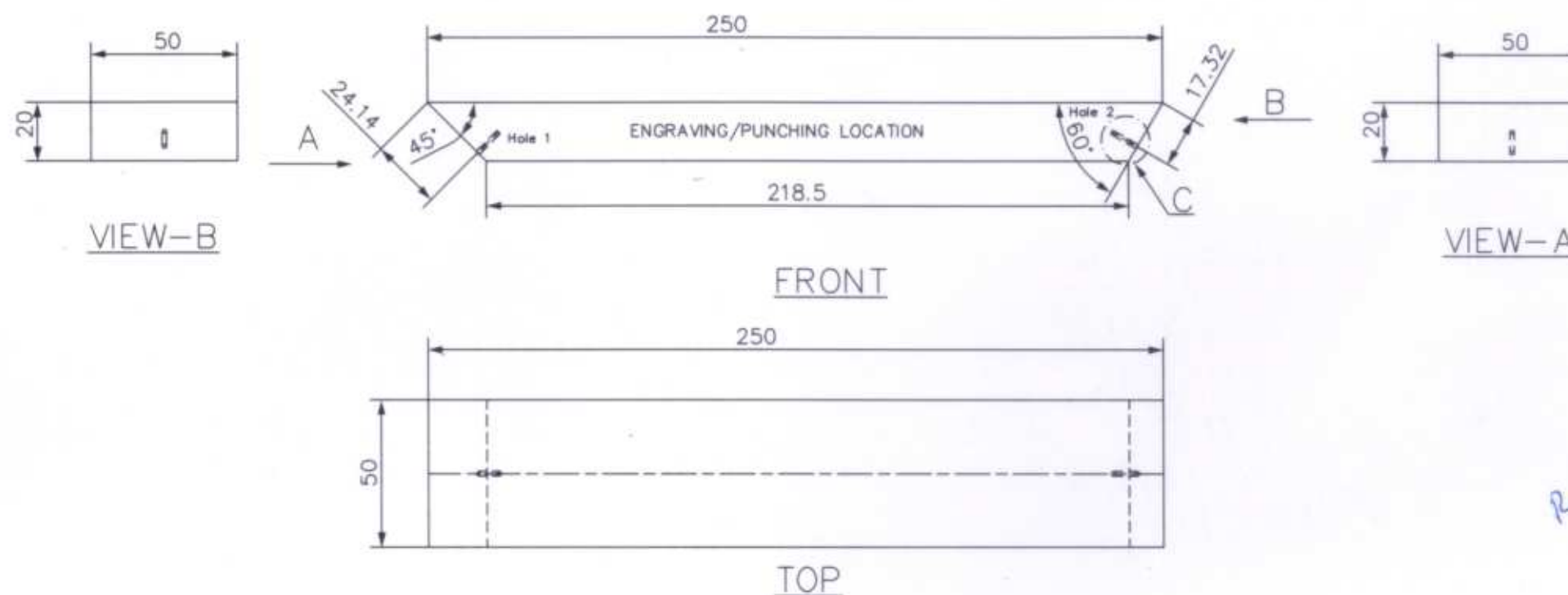
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REV	DATE	ALTERED :
		CHD&APPD :

Size A3

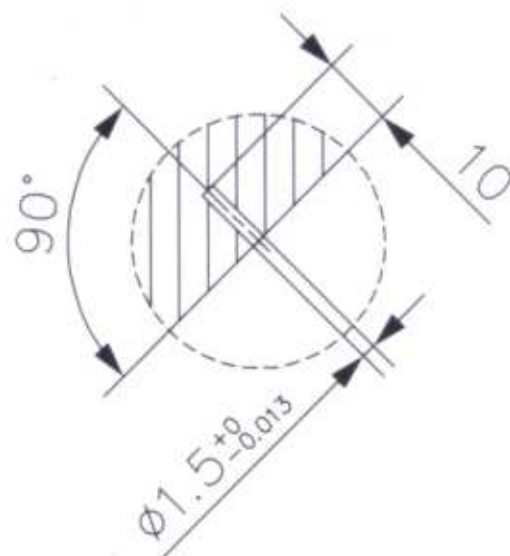
3-93-171-05497
DRAWING NO:

ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-027



DETAIL-C
(TYP)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	GS
		PLATE 20X50X250				16Mo3	A	1	
					VAR NO	MATERIAL SPECN	D1	QUANTITY	

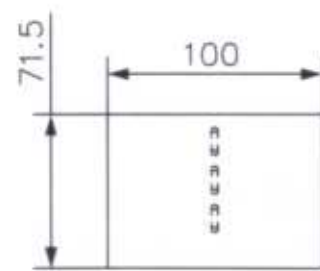
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160				
		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI 620014				
DEPT NC	GRADE OF UNTOOL DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE 150						
TITLE SUPPORT PLATE ON SHELL INSIDE 45°&60° REFERENCE BLOCK			CARD CODE U 01	DRAWING NO : 3-93-171-05497 00		REV 00

Size A3

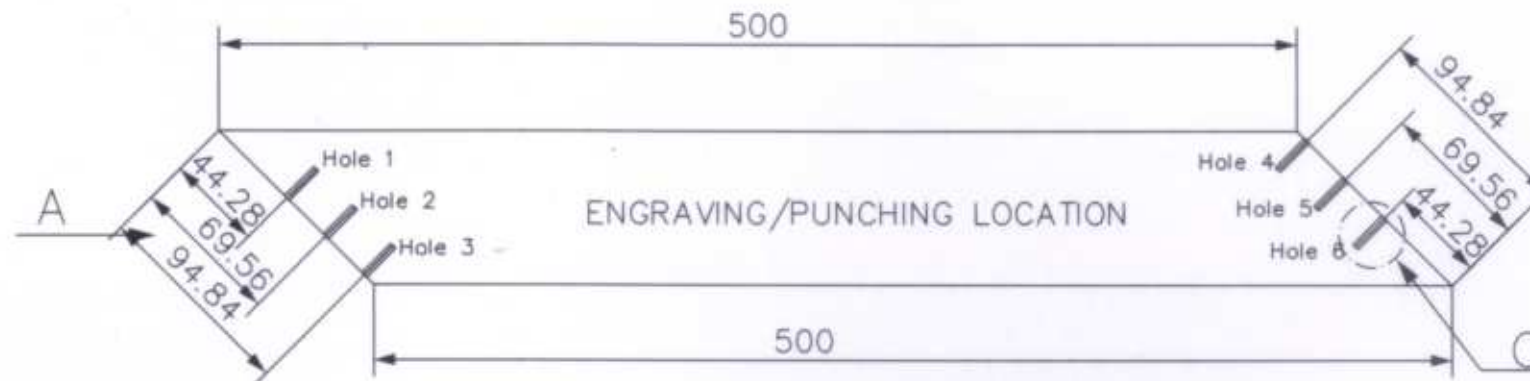
3-93-171-05498

DRAWING NO.

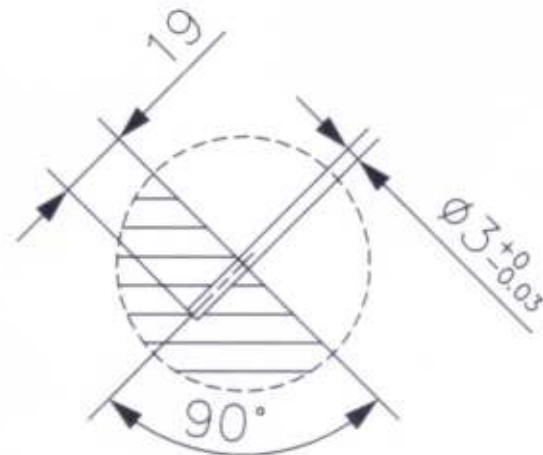
ALL DIMENSIONS ARE IN MILLIMETERS



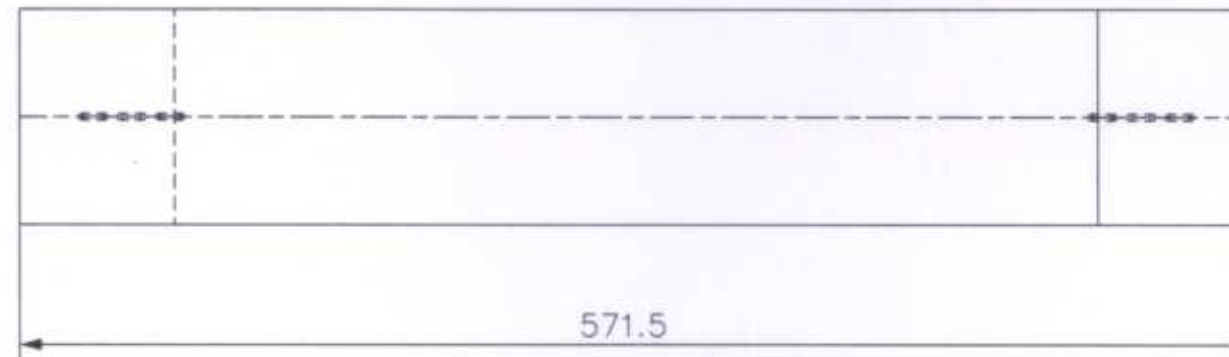
VIEW-B



FRONT



DETAIL-C
(TYP)



TOP



VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	GS
		PLATE 71.5X100X571.5			VAR NO	MATERIAL SPECN	D1	QUANTITY	
						20MnMoN155	A	1	

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-028

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		 Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	DEEPA KUMAR SINGH		06.09.19			
		REV	DEEPA V		06.09.19			
DEPT	NC	GRADE OF UNTOLO DIM	C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE	150					SA13, SA12B, SA36		
TITLE				CARD CODE	DRAWING NO :		REV	
SA13 Shell + Sec. HEAD CIRSEAM FWN, SMWN 45° REFERENCE BLOCK				U 01	3-93-171-05498 00			

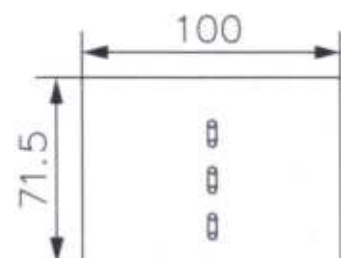
REV	DATE	ALTERED :
		CHD&APPD :

Size A3

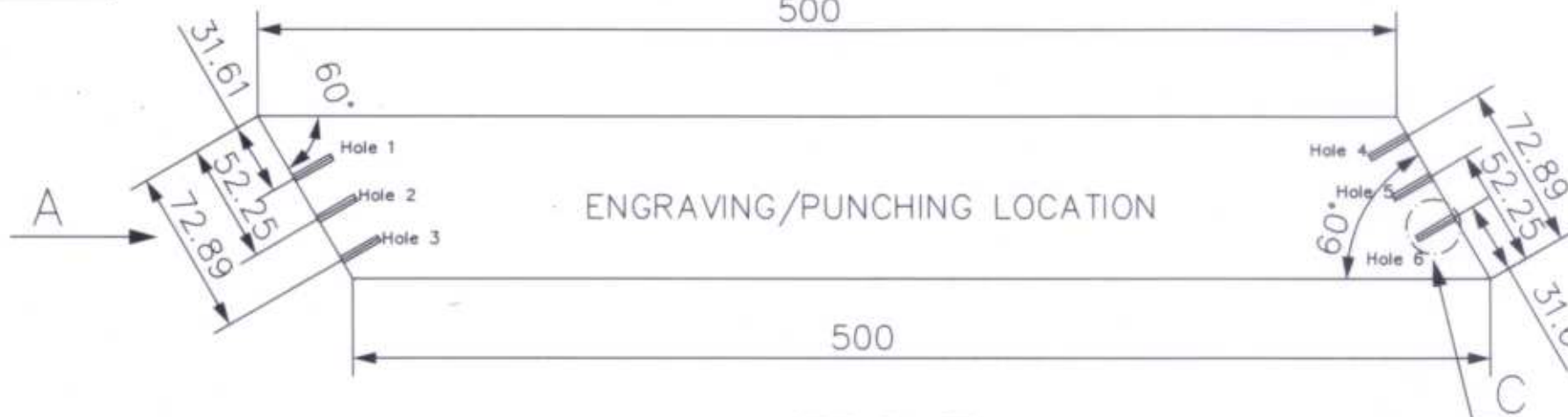
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DRAWING NO:

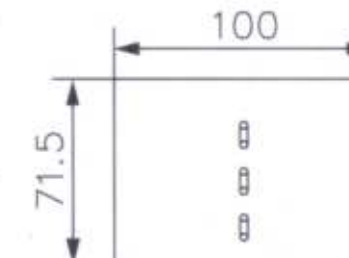
ALL DIMENSIONS ARE IN MILLIMETERS



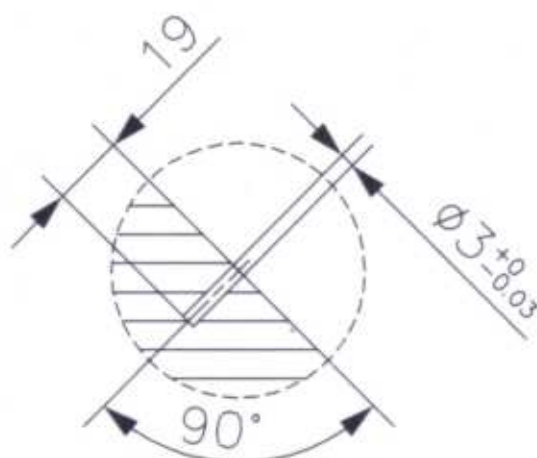
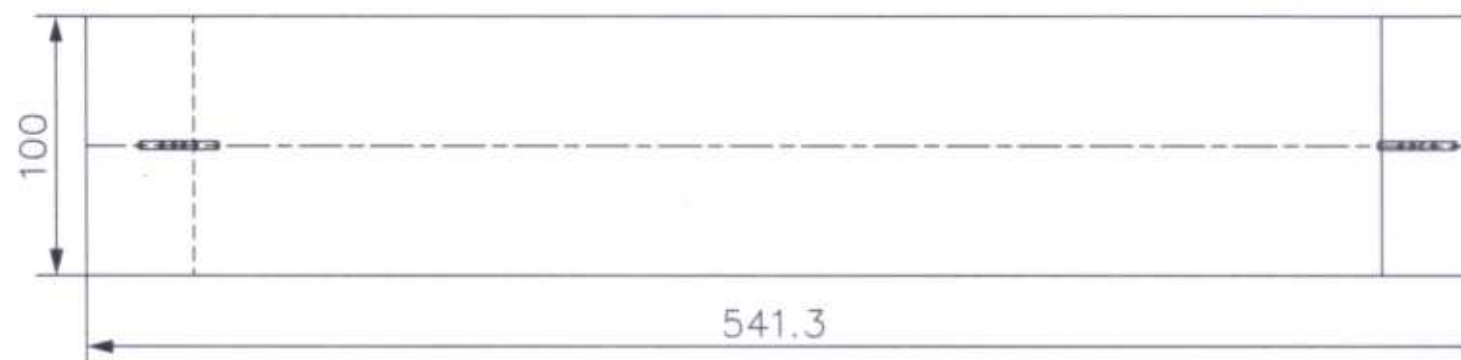
VIEW-B



FRONT



VIEW-A

DETAIL-C
(TYP)

TOP

Reviewed
H. S. S.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO VAR NO	MATERIAL CODE MATERIAL SPECN	A/C	UNIT DI	UNIT WEIGHT QUANTITY	GS
		PLATE 71.5X100X541.3				20MnMoN155	A		1	

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-029

REV	DATE	ALTERED :
		CHD&APPO :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI 620014

DRN	NAME	SIGNATURE	DATE	NO. OF VAR
CHD	AMIT KUMAR PRAJAPAT		06.09.19	
REV	DILIP KUMAR SINGH		06.09.19	
APPO	DEEPAH V		06.09.19	
	R. ARULPRABHU		06.09.19	

DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
NC	C/M/P			SA13		

TITLE	CARD CODE	DRAWING NO :	REV
SA13 Shell + Sec. HEAD CIRSEAM FWN, SMWN 60° REFERENCE BLOCK	U 01	3-93-171-05499 00	

Size A3

3-93-171-05500

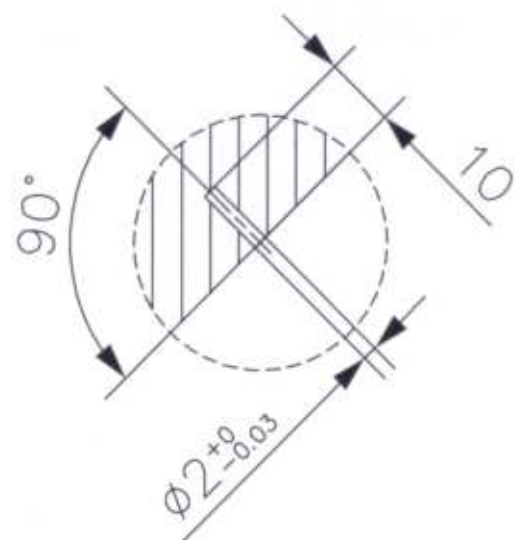
DRAWING NO:

ALL DIMENSIONS ARE IN MILLIMETERS



For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-030

DETAIL-C
(TYP)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	GS
		PLATE 40X50X400				20MnMoN155	A	1	
					VAR NO	MATERIAL SPECN	D1	QUANTITY	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

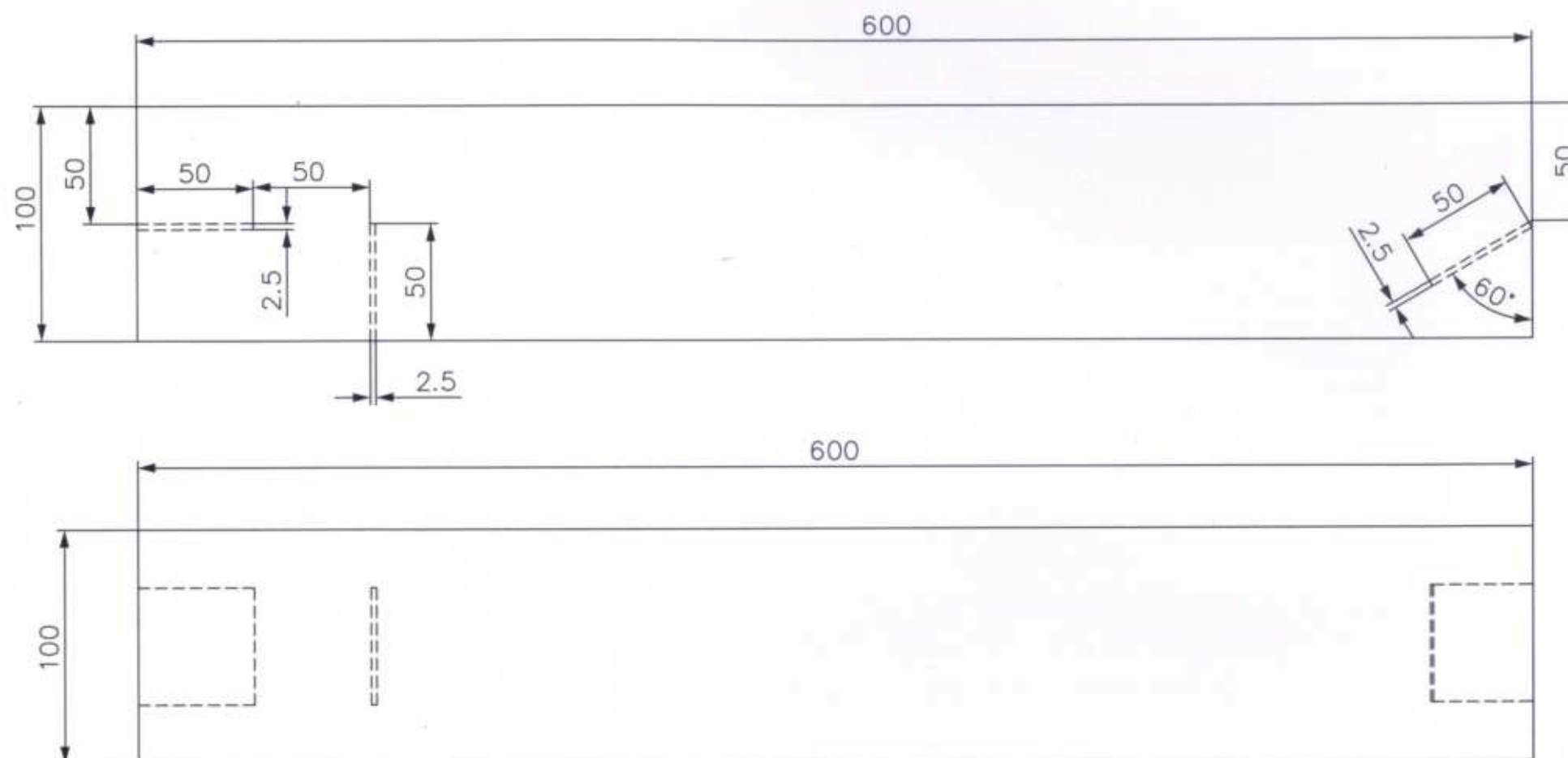
NAME	SIGNATURE	DATE	NO. OF VAR
AMIT KUMAR PRAJAPAT		06.09.19	
DEEPA KUMAR SINGH		06.09.19	
DEEPA V		06.09.19	
RARULPRABHU		06.09.19	

DEPT	GRADE OF UNTOLO DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
NC	C/M/F					
CODE 150						
TITLE GUSSET						
SUPPORT PLATE						
45°&60° REFERENCE BLOCK						
CARD CODE U 01						
DRAWING NO : 3-93-171-05500						
REV 00						

Size A3

3-93-171-05517
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



1. ALL THE CUTS SHOULD BE MADE BY SAW CUTTING M/C THROUGHT OUT THICKNESS

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-047

VARIANT NUMBER	ITEM NUMBER	PLATE 100X100X600	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A	UNIT	UNIT WEIGHT	US		
		VAR NO			MATERIAL SPECN	A/C	D1		QUANTITY			
		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160										
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		BHARAT HEAVY ELECTRICALS LTD UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014 05-229/D		SCALE 		WEIGHT (Kg)		NAME		DATE	NO. OF VAR	
								SIGNATURE				
								DRN	AMIT KUMAR PRAJAPAT			06.09.19
								CHD	DILIP KUMAR SINGH			06.09.19
								REV	DEEPESH V			06.09.19
DEPT NC		GRADE OF UNTOL DIM C/M/F		REF TO ASSY / OLD DWG		ITEM NO		No OF ITEMS				
CODE 150												
TITLE DEFECT ORIENTATION V/S AMPLITUDE BLOCK		CARD CODE U 01		DRAWING NO : 3-93-171-05517		REV 00						

Size A3

DRAWING NO:

Technical drawing of a rectangular plate with the following specifications:

- Overall dimensions: 150 (width) x 50 (height).
- Engraving/Punching Location: Indicated by a horizontal line across the top.
- Hole 1: Diameter $\phi 3.2$, located 25 units from the left edge.
- Hole 2: Diameter $\phi 3.2$, located 15 units from the bottom edge, angled at 80° .
- Hole 3: Diameter $\phi 3.2$, located 15 units from the bottom edge.
- Hole 4: Diameter $\phi 3.2$, located 15 units from the bottom edge.
- Hole 5: Diameter $\phi 1.6$, located 15 units from the bottom edge.
- Front View: Indicated by a horizontal line across the bottom.

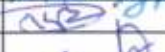
Technical drawing of a 5x5 grid of points. The grid is defined by a horizontal line and a vertical line. The horizontal distance between the first and last vertical lines is 150, with four equal segments of 25 each. The vertical distance between the first and last horizontal lines is 50, with four equal segments of 12.5 each. The points are located at the intersections of the grid lines. The points are numbered 1 through 25, starting from the top-left point and proceeding row by row to the bottom-right point.

[TOP](#)

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-048

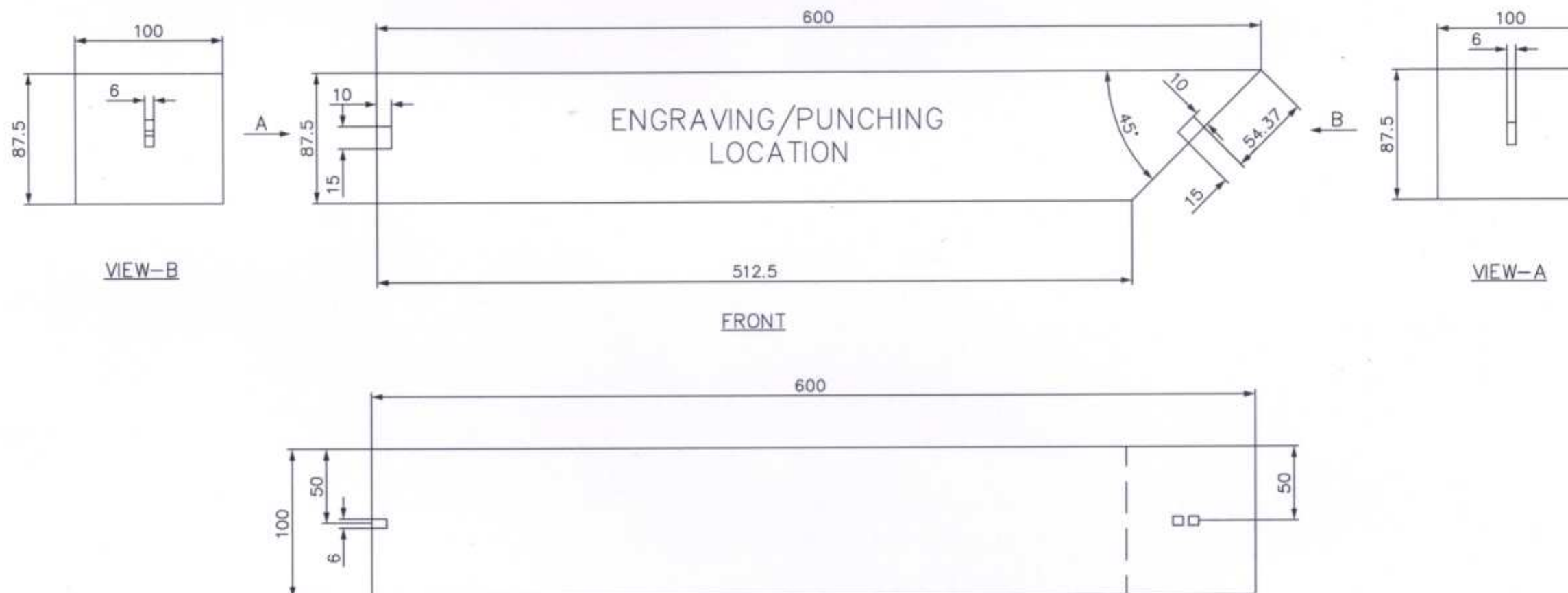
		PLATE 50X50X150						A		--
						20MnMoN155				1
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C	UNIT	UNIT WEIGHT	US
					VAR NO	MATERIAL SPECN		D1	QUANTITY	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.	TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160							
	 05-229/D Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014				DRN	NAME AMIT KUMAR PRAJAPAT	SIGNATURE 	DATE 06.09.19	NO. OF VAR	
					CHD	DILIP KUMAR SINGH		06.09.19		
					REV	DEEPESH V		06.09.19		
					APPD	R. ARULPRABHU		06.09.19		
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG			ITEM NO	No OF ITEMS	
CODE 150	TITLE FACTORS AFFECTING AMPLITUDE BLOCK				CARD CODE U 01	DRAWING NO : 3-93-171-05518			REV 00	

Size A3

3-93-171-05519
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS



TOP

For Notes refer drawing No. 3-93-171-05520

Block No.: BHEL-ATP-NPC-049

VARIANT NUMBER	ITEM NUMBER	PLATE 87.5X100X600	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	GS
					VAR NO	MATERIAL SPECN	A/C	QUANTITY	
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT					700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160				
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014 05-228/D					DRN	NAME	SIGNATURE	DATE	NO. OF VAR
					CHD	DILIP KUMAR SINGH		06.09.19	
					REV	DEEPESH V		06.09.19	
					APPD	R.ARULPRABHU		06.09.19	
DEPT NC	GRADE OF UNTOL DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG			ITEM NO	NO OF ITEMS	
CODE 150									
TITLE					CARD CODE	DRAWING NO :			REV
TRANSVERSE DEFECT SIZING BLOCK					U 01	3-93-171-05519			00

Size A3



forge monchieri

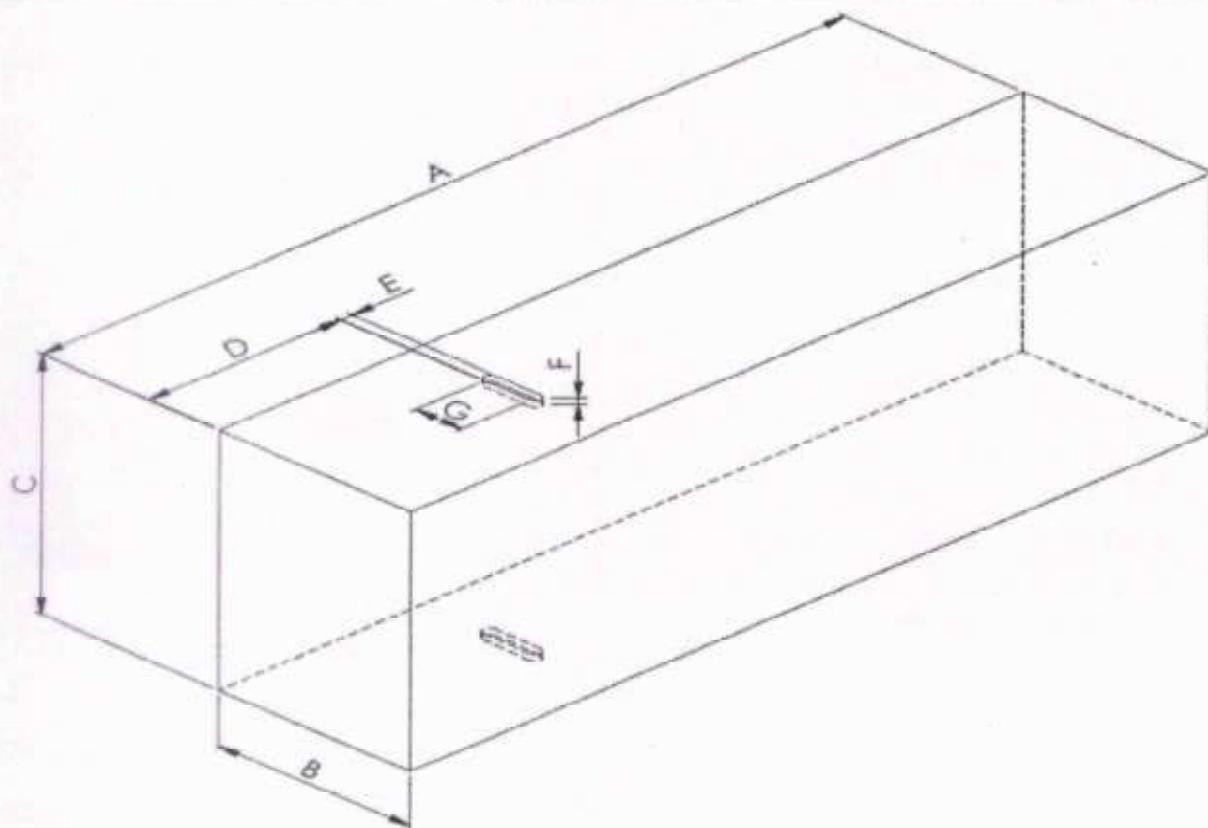
ULTRASONIC INSTRUCTION SHEET

doc. sheet 6 of 7

18-252_UT_500

Stage time of examination:

Semi-finished and finished condition after
heat treatment



Dimensions (mm)

	FM 527	FM 530
A	600 (± 1)	350 (± 1)
B	50 (± 1)	50 (± 1)
C	160 (± 1)	70 (± 1)
D	50 (± 1)	50 (± 1)
E	3 ($\pm 0,1$)	3 ($\pm 0,1$)
F	1,7 ($\pm 0,1$)	2,1 ($\pm 0,1$)
G	12 ($\pm 0,1$)	12 ($\pm 0,1$)

MATERIALE & TRATT.TERMICO

Material & Heat treatment

20MnMoNi5-5

Quenched & Tempered



Reviewed
N. Kumar
11/01/19

NOTE

- 1 - The actual dimensions of the reference reflectors shall be measured and to be verified by Bhel/NPCIL.
- 2 - Rectangular notch shall be made with a EDM process or machined.
- 3 - Block certification include: dimensional report, melt n° and heat n°.

REV	DATA / DATE	EMESSO / ISSUED	VERIFICATO / VERIFIED	APPROVATO / APPROVED	Results / Risultati
2	10-Jan-19	G. Maffessoli 	G. Fantini 	M. Garatti 	Approved 11/01/2019
		II level UT (SNT-TC-1A)	III level UT (SNT-TC-1A)	III level UT (SNT-TC-1A)	

Approved
R. Kumar
11/01/19
R. Kumar, NPCIL

DILIP KUMAR SINGH
Senior Engineer
Level II in RT,UT,MT,PT
NDTL / Quality
BHEL Trichy-14



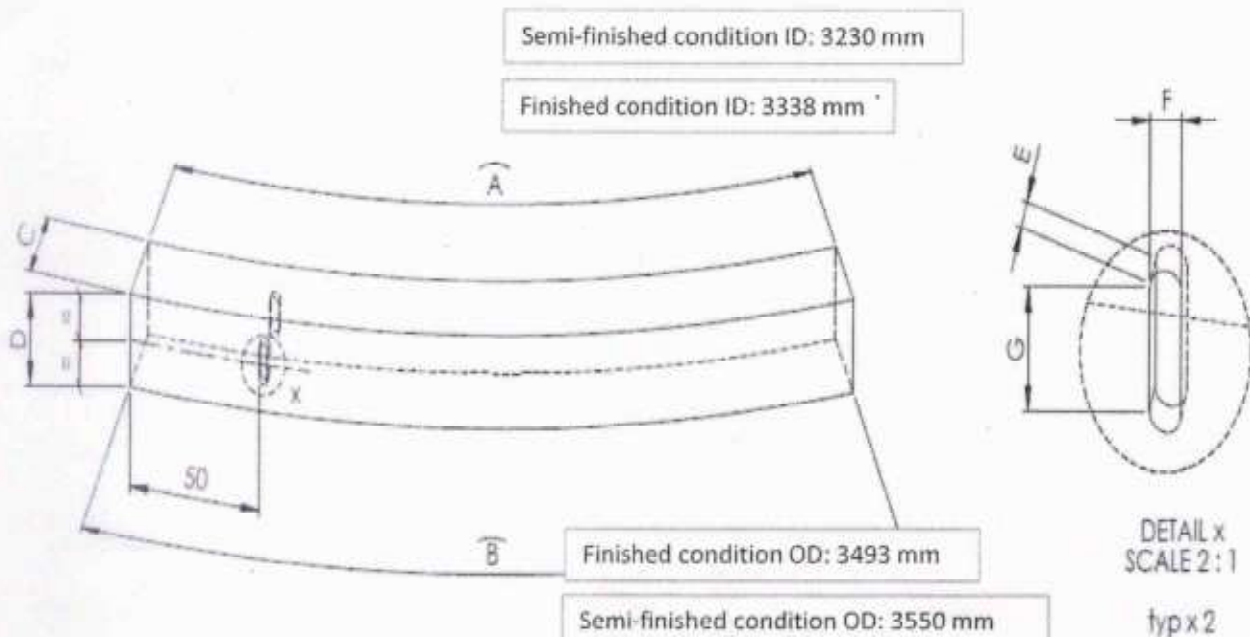
forge monchieri

ULTRASONIC INSTRUCTION SHEET

doc. sheet 7 of 7

18-252_UT_500

Stage time of examination:
Semi-finished and finished condition after
heat treatment



NB: External and Internal diameter dimensions are the same of the Shell V at inspection stage (semi finished and finished condition).

Dimensions (mm)

	FM 534	FM 545
A	750 (± 1)	400 (± 1)
B	900 (± 1)	500 (± 1)
C	160 (± 1)	72 (± 1)
D	50 (± 1)	50 (± 1)
E	2,1 (± 0,1)	2,1 (± 0,1)
F	3 (± 0,1)	3 (± 0,1)
G	12 (± 0,1)	12 (± 0,1)

MATERIALE & TRATT.TERMICO

Material & Heat treatment

20MnMoNi5-5

Quenched & Tempered



Reviewed
N. Kumar
11/01/19

NOTE

- 1 - The actual dimensions of the reference reflectors shall be measured and to be verified by Bhel/NPCIL.
- 2 - Rectangular notch shall be made with a EDM process or machined.
- 3 - Block certification include: dimensional report, melt n° and heat n°.

REV	DATA / DATE	EMESSO / ISSUED	VERIFICATO / VERIFIED	APPROVATO / APPROVED	Results / Risultati
2	10-Jan-19	G. Maffessoli 	G. Fantini 	M. Garatti 	 DILIP KUMAR SINGH Senior Engineer Level II in RT,UT,MT,PT NDTL / Quality BHEL Trichy-14
Approved R. Kumar, NPCIL 14/11/19					

Applicable for the drawing number 3-93-171-05475 to 3-93-171-05501 & 3-93-171-05515 to 3-93-171-05519

Notes:

1. Material verification & certification with proper record shall be done by PMI.
2. To qualify the material for the block, after identification and verification, UT shall be done for interested region of raw material before heat treatment stage.(If raw material stage UT record is not available.)
3. As per raw material grade specification requirement, heat treatment of all reference block material shall be done.(If raw material heat treatment record is not available.)
4. Reference block surface furnish shall be better than 6.0µm.
5. At given location in the drawing, the following information as mentioned in the drawing shall be punched
 - a. Block Number: BHEL-ATP-NPC-0XX
 - b. Material grade: 20MnMoNi55/Inconel/16Mo3
 - c. Applicable work order: D157-D160
 - d. Title of block drawing:
6. All upset metal and burrs adjacent to the FBH (Flat Bottom Hole), SDH (Side Drilled Hole), NOTCH and block sharp edges shall be merged smoothly.
7. All measurable dimensions shall be measured and reported. It shall be certified & witnessed by BHEL inspector.
8. Tolerances/allowances if not specified shall be ±0.2.
9. Hole No. Shall be engraved near to the hole face.
10. Measurements may be made by optical or replicating techniques or by co-ordinate measuring instrument.
11. Parallelism (Tolerance ±0.2) between axes of holes shall be ensured & reported.
12. Perpendicularity (Tolerance ±0.2) between axis of hole and surface in which it is being made shall be ensured and reported.
13. Flatness of the Flat Bottom Hole (FBH) shall be 1mm/125mm and located within 0.38 mm of longitudinal axis. The same shall be ensured and reported.
14. Flat bottomed Hole diameter tolerance $\begin{smallmatrix} +0.0 \\ -0.013 \end{smallmatrix}$ mm for holes 1.6 mm diameter or smaller, $\begin{smallmatrix} +0.0 \\ -0.03 \end{smallmatrix}$ mm for holes larger than 1.6 mm diameter. The same shall be ensured and reported.



REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160				
 05-229/D DEPT NC CODE 150	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		NAME	SIGNATURE	DATE	NO. OF VAR
			DRN	AMIT KUMAR PRAJAPAT	06.09.19	
			CHD	DILIP KUMAR SINGH	06.09.19	
			REV	DEEPESH V	06.09.19	
		APPD	R. ARULPRABHU	06.09.19		
GRADE OF UNTOL DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG		ITEM NO	No OF ITEMS
			SA11			
TITLE			CARD CODE	DRAWING NO :		REV
General Notes			U 01	3-93-171-05520		00

12990-121-86-8

DRAWING NO:

Applicable for the drawing number 3-93-171-05471

Notes:

1. Material verification & certification with proper record shall be done by PMI.
2. To qualify the material for the block, after identification and verification, UT shall be done for interested region of raw material before heat treatment stage.(If raw material stage UT record is not available.)
3. As per raw material grade specification requirement, heat treatment of all reference block material shall be done.(If raw material heat treatment record is not available.)
4. Reference block surface furnish shall be better than 6.0µm.
5. At given location in the drawing, the following information as mentioned in the drawing shall be punched
 - a. Block Number: BHEL-ATP-NPC-0XX
 - b. Material grade: 20MnMoNi55/Inconel/DIN17440-1. 4550(SS)
 - c. Title of block drawing:
6. All upset metal and burrs adjacent to the FBH (Flat Bottom Hole), SDH (Side Drilled Hole) and block sharp edges shall be merged smoothly.
7. All measurable dimensions shall be measured and reported.It shall be certified & witnessed by BHEL inspector.
8. Tolerances/allowances if not specified shall be ± 0.1 for linear dimensions and ± 0.2 for angular dimensions.
9. Measurements may be made by optical or replicating techniques or by co-ordinate measuring instrument.
- 10.Parallelism (Tolerance ± 0.2) between axes of holes shall be ensured & reported.
- 11.Perpendicularity (Tolerance ± 0.2) between axis of hole and surface in which it is being made shall be ensured and reported.
- 12.Top of bottom view engraving of lines shall be done at 1° increments and legends at 60°, 65°, 70°, and 75°. For details refer formula for Scale X. The Scale X is 60°-75°, 1° increments.
- 13.Bottom of bottom view engraving of lines shall be done at 1° increments and legends at 70°, 75°, and 80°. For details refer formula for Scale Y. The Scale Y is 70°-80°, 1° increments.
- 14.Top of top view engraving of lines shall be done at 1° increments and legends at 35°, 40°, 45°, 50°, 55°, 60°, and 65°. For details refer formula for Scale Z. The Scale Z is 35°-65°, 1° increments.
- 15.Depth of engraving shall be 0.5mm. The height of characters for engraving shall be 5mm. Length of the big line engraving shall be 6mm and length of the small line engraving shall be 4mm. Refer Table for location of lines.
- 16.In order to avoid sharp edges, or remove in-service nicks and burrs, block edges may be smoothed by beveling or rounding, provided the corner treatment does not reduce the edge dimension by more than 0.5 mm.

17.Scales (Refer Table for values)

Top of bottom view scale X = $30 \tan \alpha$ with tolerance of 0.1mmBottom of bottom view scale Y = $15 \tan \beta$ with tolerance of 0.1mmTop of top view scale Z = $70 \tan \gamma$ with tolerance of 0.1mm

REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

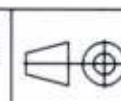
700MWe-GHAVP-STEAM GENERATOR
W.O.D157 TO D160



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT
NC
CODE
150

GRADE OF
UNTOL. DIM
C/M/F



SCALE

WEIGHT (Kg)

NAME	SIGNATURE	DATE	NO. OF VAR
DRN AMY KUMAR PRAJAPAT		06.09.19	
CHD DILIP KUMAR SINCH		06.09.19	
REV DEEPESH V		06.09.19	
APPD R. ARULPRABHU		06.09.19	

REF TO ASSY / OLD DWG

SA11

TITLE

Notes for V1 Block

CARD
CODE
U 01

DRAWING NO :

3-93-171-05521 00

REV

Size A3

ALL DIMENSIONS ARE IN MILLIMETERS

Angle	Scale X (60°-75°) in mm	Scale Y (70°-80°) in mm	Scale Z (35°-65°) in mm	Big line length 6 mm, Small line length 4 mm
35			49.01	Big line Engraving with legend 35°
36			50.85	Small line Engraving
37			52.75	Small line Engraving
38			54.69	Small line Engraving
39			56.68	Small line Engraving
40			58.74	Big line Engraving with legend 40°
41			60.85	Small line Engraving
42			63.03	Small line Engraving
43			65.28	Small line Engraving
44			67.60	Small line Engraving
45			70.00	Big line Engraving with legend 45°
46			72.49	Small line Engraving
47			75.07	Small line Engraving
48			77.74	Small line Engraving
49			80.53	Small line Engraving
50			83.42	Big line Engraving with legend 50°
51			86.44	Small line Engraving
52			89.60	Small line Engraving
53			92.89	Small line Engraving
54			96.35	Small line Engraving
55			99.97	Big line Engraving with legend 55°
56			103.78	Small line Engraving
57			107.79	Small line Engraving
58			112.02	Small line Engraving
59			116.50	Small line Engraving
60	51.96		121.24	Big line Engraving with legend 60°
61	54.12		126.28	Small line Engraving
62	56.42		131.65	Small line Engraving
63	58.88		137.38	Small line Engraving
64	61.51		143.52	Small line Engraving
65	64.34		150.12	Big line Engraving with legend 65°
66	67.38			Small line Engraving
67	70.68			Small line Engraving
68	74.25			Small line Engraving
69	78.15			Small line Engraving
70	82.42	41.21		Big line Engraving with legend 70°
71	87.13	43.56		Small line Engraving
72	92.33	46.17		Small line Engraving
73	98.13	49.06		Small line Engraving
74	104.62	52.31		Small line Engraving
75	111.96	55.98		Big line Engraving with legend 75°
76		60.16		Small line Engraving
77		64.97		Small line Engraving
78		70.57		Small line Engraving
79		77.17		Small line Engraving
80		85.07		Big line Engraving with legend 80°

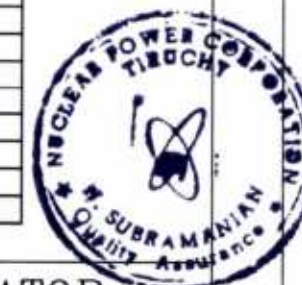
Applicable for the drawing 3-93-171-05472 to 3-93-171-05474

Notes:

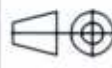
1. Material verification & certification with proper record shall be done by PMI.
2. To qualify the material for the block, after identification and verification, UT shall be done for interested region of raw material before heat treatment stage.(If raw material stage UT record is not available.)
3. As per raw material grade specification requirement, heat treatment of all reference block material shall be done.(If raw material heat treatment record is not available.)
4. Reference block surface furnish shall be better than 6.0 μ m.
5. At given location in the drawing, the following information as mentioned in the drawing shall be punched
 - a. Block Number: BHEL-ATP-NPC-0XX
 - b. Material grade: 20MnMoNi55/Inconel/DIN17440-1. 4550(SS)
 - c. Title of block drawing:
6. All upset metal and burrs adjacent to the FBH (Flat Bottom Hole), SDH (Side Drilled Hole) and block sharp edges shall be merged smoothly.
7. All measurable dimensions shall be measured and reported. It shall be certified & witnessed by BHEL inspector.
8. Tolerances/allowances if not specified shall be ± 0.1 for linear dimensions and ± 0.2 for angular dimensions.
9. Measurements may be made by optical or replicating techniques or by co-ordinate measuring instrument.
- 10.Parallelism (Tolerance ± 0.2) between axes of holes shall be ensured & reported.
- 11.Perpendicularity (Tolerance ± 0.2) between axis of hole and surface in which it is being made shall be ensured and reported.
12. Top of front view engraving of lines shall be done at 1° increments and legends at 30°, 35°, 40°, 45°, 50°, 55°, 60°, and 65°. For details refer formula for Scale X. The Scale X is 30°-65°, 1° increments.
13. Bottom of the front view engraving of lines shall be done at 1° increments and legends at 60°, 65°, 70°, and 75°. For details refer formula for Scale Y. The Scale Y is 60°-75°, 1° increments.
14. Depth of engraving shall be 0.5mm. The height of characters for engraving shall be 5mm. Length of the big line engraving shall be 6mm and length of the small line engraving shall be 4mm. Refer Table for location of lines.
15. In order to avoid sharp edges, or remove in-service nicks and burrs, block edges may be smoothed by beveling or rounding, provided the corner treatment does not reduce the edge dimension by more than 0.5 mm
16. Flatness of the Flat Bottom Hole (FBH) shall be 1mm/125mm and located within 0.38 mm of longitudinal axis. The same shall be ensured and reported.
17. Flat bottomed Hole diameter tolerance $^{+0.0}_{-0.03}$ mm . The same shall be ensured and reported.
18. Scales (Refer Table for values)

Top of front view scale X = 19.43 tan α with tolerance of 0.1mmBottom of front view scale Y = 6.66 tan β with tolerance of 0.1mm

Angle in degree	Scale X (30°-65°) in mm	Scale Y (60°-75°) in mm	Big line length 6mm, Small line length 4mm
30	11.22		Big line Engraving with legend 30°
31	11.67		Small line Engraving
32	12.14		Small line Engraving
33	12.62		Small line Engraving
34	13.11		Small line Engraving
35	13.61		Big line Engraving with legend 35°
36	14.12		Small line Engraving
37	14.64		Small line Engraving
38	15.18		Small line Engraving
39	15.73		Small line Engraving
40	16.30		Big line Engraving with legend 40°
41	16.89		Small line Engraving
42	17.49		Small line Engraving
43	18.12		Small line Engraving
44	18.76		Small line Engraving
45	19.43		Big line Engraving with legend 45°
46	20.12		Small line Engraving
47	20.84		Small line Engraving
48	21.58		Small line Engraving
49	22.35		Small line Engraving
50	23.16		Big line Engraving with legend 50°
51	23.99		Small line Engraving
52	24.87		Small line Engraving
53	25.78		Small line Engraving
54	26.74		Small line Engraving
55	27.75		Big line Engraving with legend 55°
56	28.81		Small line Engraving
57	29.92		Small line Engraving
58	31.09		Small line Engraving
59	32.34		Small line Engraving
60	33.65	11.54	Big line Engraving with legend 60°
61	35.05	12.01	Small line Engraving
62	36.54	12.53	Small line Engraving
63	38.13	13.07	Small line Engraving
64	39.84	13.65	Small line Engraving
65	41.67	14.28	Big line Engraving with legend 65°
66		14.96	Small line Engraving
67		15.69	Small line Engraving
68		16.48	Small line Engraving
69		17.35	Small line Engraving
70		18.30	Big line Engraving with legend 70°
71		19.34	Small line Engraving
72		20.50	Small line Engraving
73		21.78	Small line Engraving
74		23.23	Small line Engraving
75		24.86	Big line Engraving with legend 75°



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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe-GHAVP-STEAM GENERATOR W.O.D157 TO D160						
 05-229/D		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN CHD REV APPD	NAME AMIT KUMAR PRAJAPAT DILIP KUMAR SINGH DEEPESH V R. ARULPRABHU	SIGNATURE 	DATE 06.09.19 06.09.19 06.09.19 06.09.19	NO. OF VAR
DEPT NC	GRADE OF UNTOL. DIM C/M/F	SCALE 	WEIGHT (Kg)	REF TO ASSY / OLD DWG		ITEM NO	No OF ITEMS	
CODE 150				SA11				
TITLE Notes for V2 Block			CARD CODE U 01	DRAWING NO : 3-93-171-05522			REV 00	