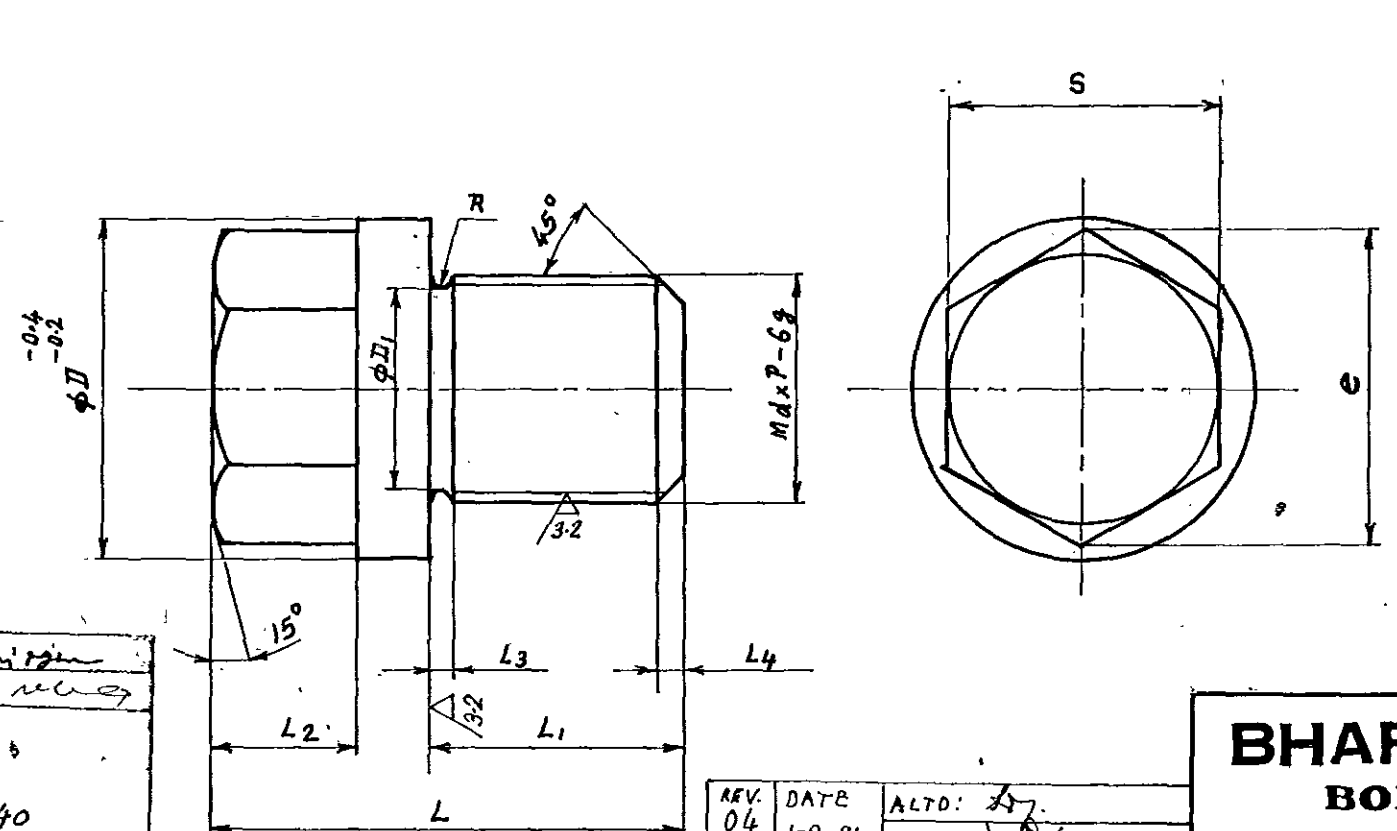


SL NO	DRAWING NUMBER	RAW MATL DETAILS				WT [KG]		DIMENSIONS											COMPONENT CODE	REMARKS
		SIZE	SPECN	MATL CODE	SCRAP SORT	GROSS	NET	Md x P - 6g	ϕD_1	e	S	L	L ₁	L ₂	L ₃	L ₄	R			
01	3V 5144 06413/02	$\phi 40 \times 60$	ASTM A193-B7, QUENCHED & TEMPERED, CERTIFY	15 039 116	20	0.59	0.27	M24x2	37	21	34.6	30	51	24	16	3	2	1.5	931006770000	-
02	3V 5150 06413/02	$\phi 50 \times 70$		15 039 197	20	1.11	0.33	M30x2	43	27	41.6	36	62	30	19	3	2	1.5	931006780000	-
03	3-V-5152-06413/02	$\phi 36 \times 50$		15 039 088	20	0.40	0.14	M20x1.5	30	16.5	28	24	40	20	13	3	2	1.5	931007480000	-
04	3-V-5186-06413/02	$\phi 32 \times 46$	ASME SA182-GR-F60, HARDENED & TEMPERED, CERTIFY	-	40	0.29	0.14	M20x1.5	30	16.5	28	24	40	20	13	3	2	1.5	931048020000	3" 300c
05	3-V-5188-06413/02	$\phi 40 \times 57$		-	40	0.56	0.27	M24x2	37	21	34.6	30	51	24	16	3	2	1.5	931048030000	4" & 6" - 300c
06	3-V-5189-06413/02	$\phi 45 \times 68$		-	40	0.85	0.33	M30x2	43	27	41.6	36	62	30	19	3	2	1.5	931048040000	8" 300c
07	3-V-1447-06413/01	$\phi 50 \times 55$	ASTM A193-B7, RT, CERTIFY	15 039 197	20	0.88	0.30	M30x1.5	43	27	41.6	36	46	14	19	3	2	1.5	931064790000	-
08	3-V-5199-06413/01	$\phi 32 \times 46$	SA182 GR F316	-	46	0.29	0.14	M20x1.5	30	16.5	28	24	40	20	13	3	2	1.5	931068440000	-
09	3-V-5196-06413/02	$\phi 40 \times 57$	SOLUTION HEAT TREATED	-	46	0.56	0.27	M24x2	37	21	34.6	30	51	24	16	3	2	1.5	931068450000	-
10	3-V-2001-06413/02	$\phi 50 \times 75$	CERTIFY	-	46	0.88	0.3	M30x2	43	27	41.6	36	62	30	19	3	2	1.5	931068460000	-



12.5 / 32

NOTES:-
 1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5x45.
 2. HARDNESS - 26 TO 32 HRC FOR B7 MATL.

655390

REV	DATE	ALTD:
07	9.12.96	R. T. ...

NOTES UPDATED
 REFER DCN. CS. 0640

REV	DATE	ALTD:
06	17-06-96	N.D. PAL

SL. NO. 8 TO 10 ARE INCLUDED.

REV	DATE	ALTD:
03	5-1-94	N. DHANAPAL

1. SLNO 4 TO 6 INCLUDED.

REV	DATE	ALTD:
05	13.2.96	R. L. ...

SL. No. 07 INCLUDED.

REV	DATE	ALTD:
02	6.7.88	S. J. W

IN SL. No 3 THE THREAD PITCH 2 IS CHANGE TO 1.5
 DCN No. GW/88/0018

1) NOTE UNSPECIFIED TOL. REF. CHANGED TO SQP
 2) DCN No. CS: 0260

REV	DATE	ALTD:
01	25.10.85	S. J. WESLEY

SL. No. 03 ADDED

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

FIRST ANGLE	SCALE	DRAWN	N.P.ESWARAN	TOTAL NET WT. (kg)
	NTS	CHECKED	A.V. ...	TYPE
ALL DIMENSIONS IN MILLIMETRES		APPROVED	N.NAGARAJAN	DATE
			13-08-85	NEW/OLD DRG. NO.

CAUTION
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PLUG

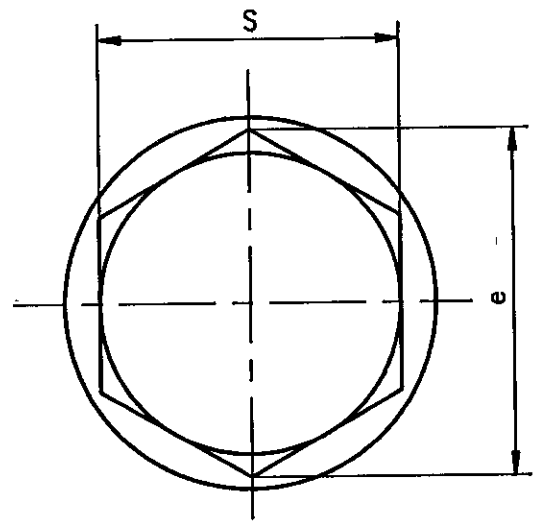
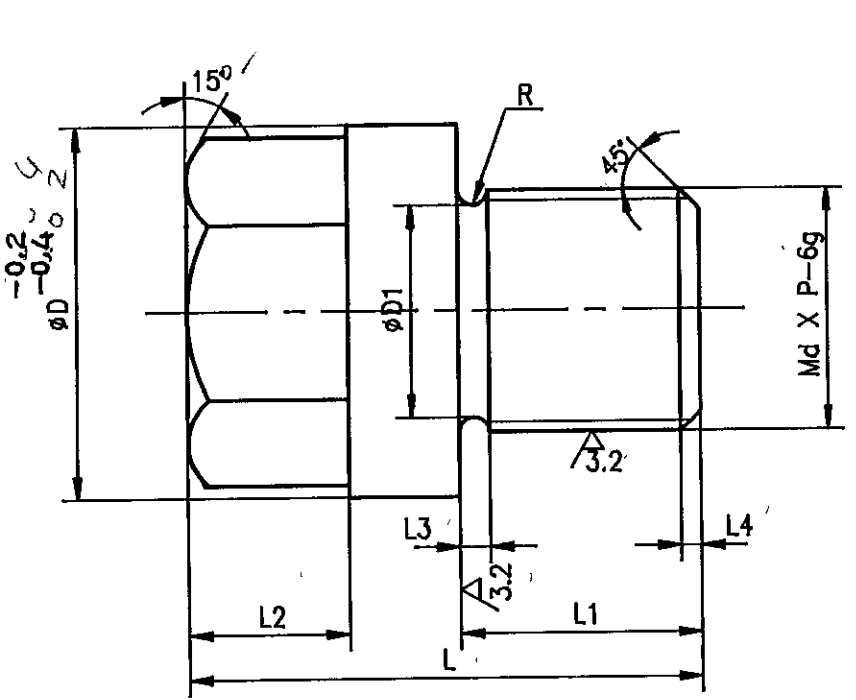
DRAWING NO. **3V 0000 06413**

REVISION **08**

20/85690-0000-3-V-3
DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETRES

SL. NO.	DRAWING NO.	COMP. CODE	RAW MATERIAL				DIMENSION												NET WT.(KG)	REMARKS
			MATL. SPECN.	SUGGESTED SIZE	SCRAP SORT	GROSS WT.(KG)	MdXP-6g	ØD	ØD1	e	S	L	L1	L2	L3	L4	R			
01	3-V-5182-06958	931043270000	ASTM A193 B16 Q & T. CERTIFY	Ø40 X 60	20	0.58	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	0.27		
02	3-V-5195-06958	931061030000		Ø50 X 70		1.11	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	0.33		
03	3-V-5198-06958	931063960000		Ø36 X 50		0.4	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	0.14		



12.5 / 32

NOTE
1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5X45°

TOLERANCE FOR UNTOLERANCED DIMENSIONS	
UPTO 6 MM	= ± 0.1 MM
> 6 UPTO 120 MM	= ± 0.2 MM
MORE THAN 120 MM	= ± 0.5 MM
ANGULAR TOLERANCE	= ± 0.5 Deg.
CHAMFER	= ± 5 Deg.

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NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
BHARAT HEAVY ELECTRICALS LTD. UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.					DRN	V.BAIRAVAN	SIGN	DATE	NO. OF VAR.
					CHD	N.DHANAPAL		17.6.93	
					APPD	A.V.NATHAN		28.6.93	
DEPT VL	GRADE OF UNTOL DIM	SCALE	WEIGHT (KG).	REFERENCE INFORMATION					
CODE 320	Ø / M / P	NTS	-	---					
TITLE						CARD CODE	DRAWING NO.		REV
PLUG						U 01	3-V-0000-06958		02

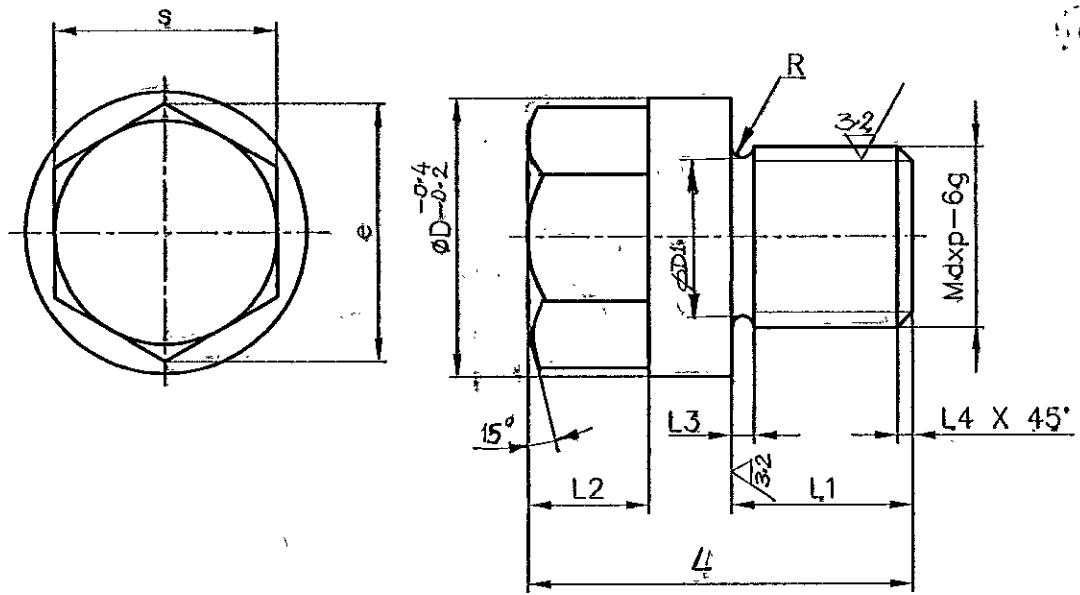
REV	DATE	ALTD: N.D.PAL	REV	DATE	ALTERED N.D.PAL
02	14-03-96	CHD & APPD: <i>[Signature]</i>	01	6-11-95	CHECKED: <i>[Signature]</i>

1. SLNO. 3 INCLUDED. SL. NO. 2 IS INCLUDED

ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO	SL.No	DRAWING NUMBER	MATL. SPECN	DIMENSIONS											COMPONENT CODE	SCRAP SORT	WEIGHT
				Mdxp-6g	ϕD_1	ϕD_2	e	s	L	L1	L2	L3	L4	R			
	01	3-V-2021-22675/01	ASTM A193 B7	M48x3	65	45	63.5	55	80	35	38	1.5	2	1.5	931177660000	10	1.68
	02	3-V-2029-22675	ASTM A193 B16	M48x3	65	45	63.5	55	80	35	38	1.5	2	1.5	931178500000	20	1.68

12.5 / 32



NOTES: -
1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5X45°.
2. HARDNESS - 26 TO 32 HRC FOR B7 MATL.

REV	DATE	ALTD	REV	DATE	ALTERED
02	19.8.2008	CHD & APPD: P.R.K. M...	01	16.8.2000	CHD & APPD: P.R.K. M...
SL. NO. 02 ADDED.			DIMN 'e' 63.5 WAS 54		
DCN:QN:0684					

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NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.				DRN	NAME	SIGN	DATE	NO. OF VAR.	
365-121				CHD	P.R.K.	[Signature]	17.9.99		
				APPD	SCS	[Signature]	17.9.99		
DEPT	VL	SCALE	WEIGHT (KG)	REFERENCE INFORMATIONS				NO. OF ITEMS	
CODE	320	NTS	-						
TITLE					CARD CODE	DRAWING NO.			REV
PLUG					U 01	3-V-0000-22675			02

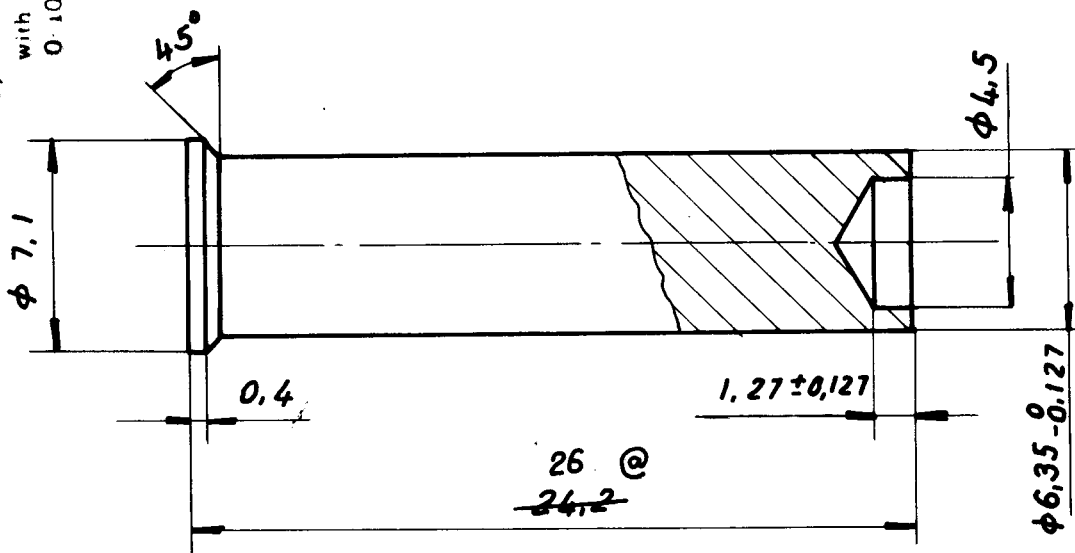
FIRST ANGLE PROJECTION (ALL DIMENSIONS)

REV 01	DATE 25.02.84	ALTERED M. [Signature]	CHECKED	REV 02	DATE 12-3-90	ALTERED M. [Signature]	CHECKED
ZONE @ DIMENSION 26 WAS 24.2				COMPONENT CHANGED INTO SUB-DELIVERY ITEM. MATERIAL AISI -410 WAS A582-416			

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General Notes:
 A) All Diameters Concentric to O-102 T.I.R.
 B) All Key Surfaces at Right Angles with Centre-Line of bore to 0.102 I.I.R.

3.2 / ∇



- NOTE:**
 1. HARDNESS 250 TO 300 HB
 2. QUENCHING AND TEMPERING.

MICROFILMED ON 0052.6 FILE 295

		96 452 053	AISI 410 OR EQT. CERTIFY	QT		0,006		188	
NO OFF	DESCRIPTION	CODE NO	FINAL MATL.	HEAT TREATMENT	SCRAP SORT	NET WT (KG)	GROSS WT (KG)	DRG. NO	ITEM NO.



BHARAT HEAVY ELECTRICALS LIMITED
 BOILER PLANT UNIT, TIRUCHIRAPALLI-620014

05-249/A

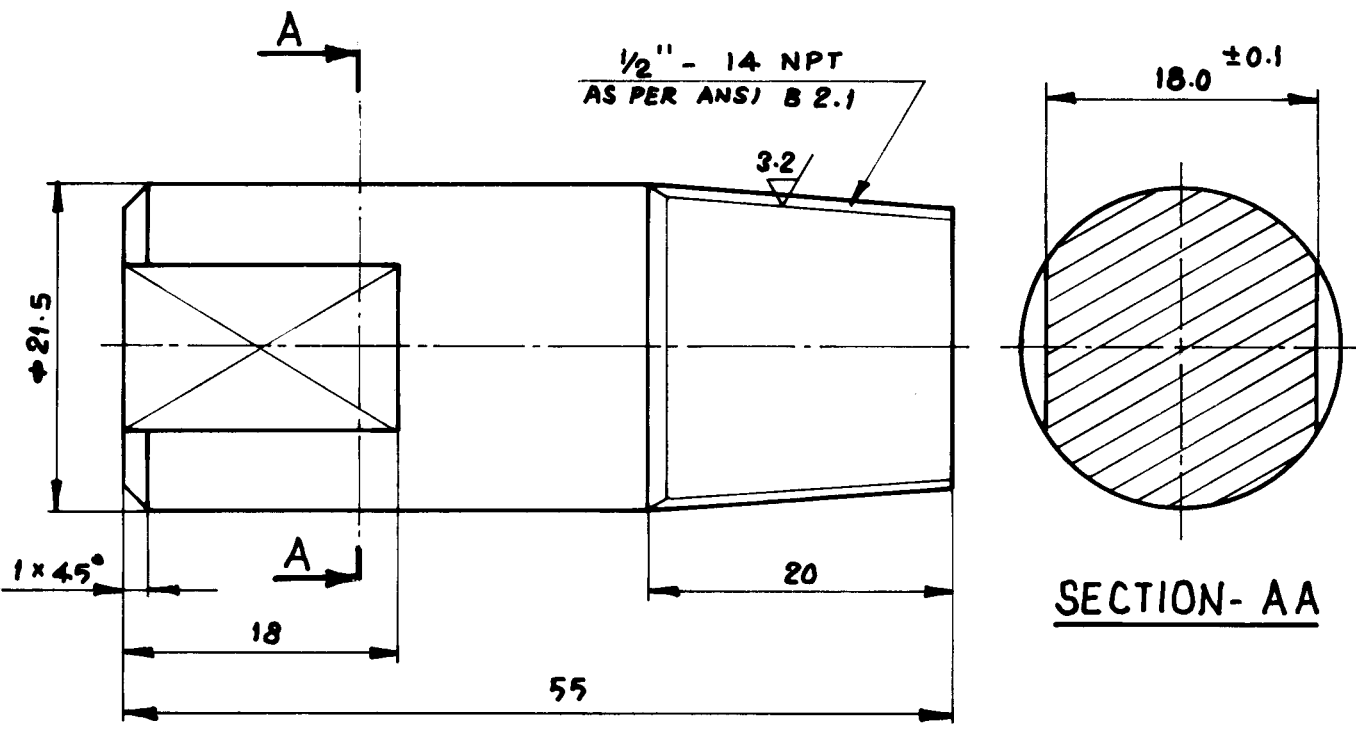
DEPT	CODE		SCALE N.T.S.	WEIGHT (kg.)	PKG GLAND BOLT PIN D-958A30A/EF-355 (538)				
------	------	--	--------------	--------------	---	--	--	--	--

TITLE PIN				NAME	SIGN	DATE
				[Signature]	[Signature]	10.2.79

DIMENSIONS TO BE CONTROLLED WITHIN LIMITS AS SHOWN. MACHINING TOLERANCE ± 0.25 mm. UNLESS OTHERWISE SHOWN NON-MACHINING TOLERANCE \pm

4 DRAWING NO. 4.V.5907.04932 15 16 REV 17 02

6.3 / 3.2



01	BAR ϕ 22 x 60	15339 343	SA 105	NORMALISED	10	0.15	0.18	33166 502-0000
								4-V-M305-06587
NO. OF PIECES	DESCRIPTION	MATL. CODE	FINAL MATERIAL	HEAT TREATMENT	SCRAP SORT	NET Wt (kg)	GROSS Wt (kg)	COMPONENT CODE DRAWING No.
REMARKS				TOTAL NET Wt (kg)				
NTS	SCALE	DRAWN	14. <i>[Signature]</i>	ALTERATIONS		DATE	SIGNATURE	ALTERATION INDEX
		CHECKED						
		APPROVED	N. NAGARAJAN. <i>[Signature]</i>					
		STDS. OFFICER		TRANS. COPY NO.				
		DATE	14-11-90					
TYPE		GROUP		OLD DRG.		NEW DRG.		
TITLE		PLUG		DRAWING NO.		4-V-M305-06587		



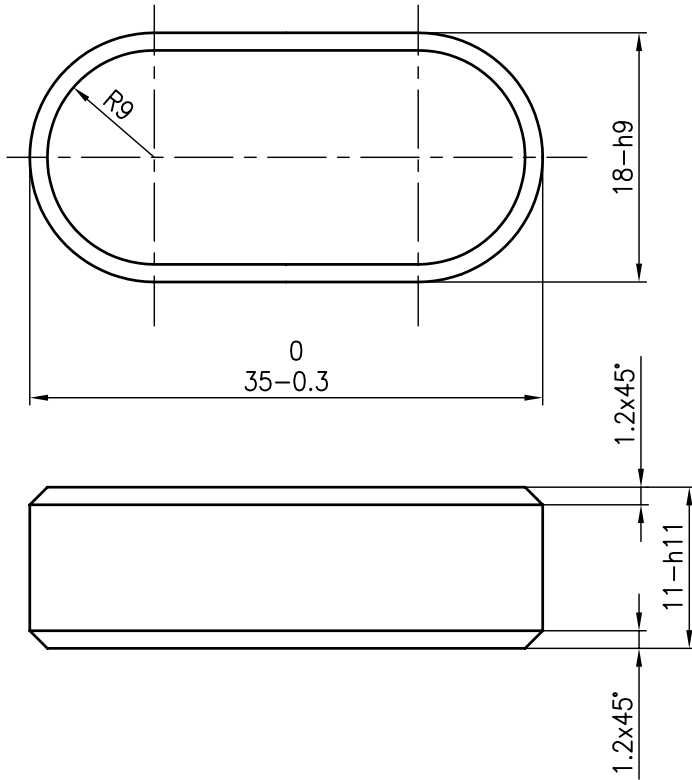
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS

ALL DIMENSIONS ARE IN MILLIMETRES.
DURING MANUFACTURE REFER RELEVANT QCP/QP

REV	DATE	ALTERED
		CHD & APPD

3.2 /

18-h9	0 -0.043
11-H11	0 -0.110



NOTE:

HARDNESS REQUIRED IS 220 TO 270 BHN.

COMP.CODE: 931108190000

	ø30x40		IS1875 CL.4 CERTIFY	NR	10	0.20	0.67		
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
 365-122	BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI 620014.			DRN	NAME V.BAIRAVAN		SIGN	DATE 12.4.03	NO. OF VAR
				CHD	R.L.NARAYANAN			12.4.03	
				APPD	M.RAJAKUMAR			12.4.03	
DEPT VL	/	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS				NO. OF ITEMS	
CODE		NTS		C426442					
TITLE PARALLEL KEY				CARD CODE U 01	DRAWING NO. 4-V-NC08-26442				REV 0

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PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41501

PAGE 1 OF 5

Based on IS: 2048-1983

PARALLEL KEYS - TYPE A

1.0 SCOPE

Covers the requirements for keys with both ends round (type A).

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and tolerances	Table 1 of this standard	
Preferred length and size combination	Table 2 of this standard	
Material	Steel of tensile strength not less than 600 MPa	
Finish	Natural finish	
Sampling and Acceptability	Indian standard	IS: 6821
General requirements	Keys shall comply with IS: 2048 in respect of requirements not covered in this standard	

2.1 Referred Standards (Only the current versions are applicable)

IS: 2048 Specification for parallel keys and keyways

IS: 6821 Methods for sampling non-threaded fasteners

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REVISIONS

DATE

APPROVED

STANDARDS SECTION
ENGINEERING AND DEVELOPMENT CENTRE
HPBP TIRUCHIRAPALLI

PREPARED

HPBP TIRUCHY

ISSUED
STANDARDS
ENGG

DATE

DEC 1986



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41501

PAGE 2 OF 5

3.0 DESIGNATION

A parallel key to this standard of width 12mm height 8mm and length 56mm shall be designated as:

3.1 On Drawings:

- i) Material Specification column: IS: 2048-A
- ii) Description column : KEY PRL RND END 12x8x56
- iii) Drawing Number column : 4150108056
- iv) Material Code column : 4150112056

3.2 Ordering Description

For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.

Parallel key A 12x8x56

4.0 ADDITIONAL INFORMATION

- 4.1 For keyways to these keys refer IS: 2048 or AA 023 15 08.

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PLANT STANDARD

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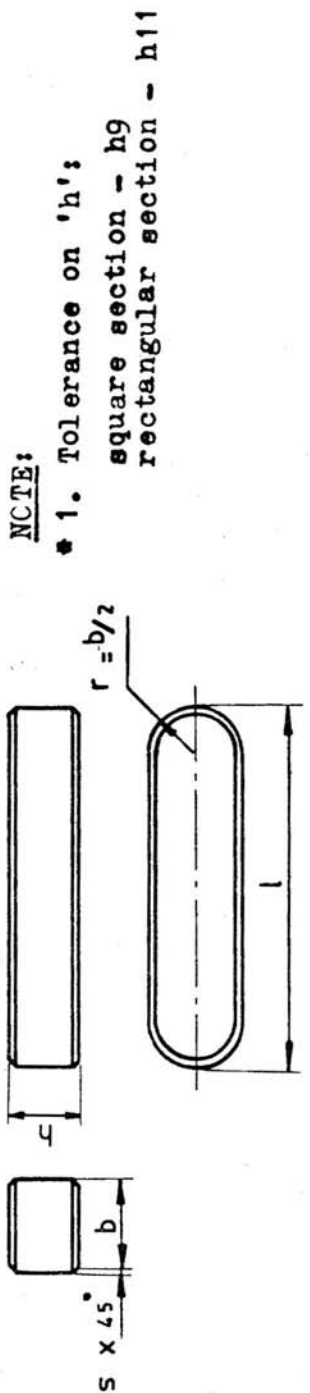
BPS: 41501

PAGE 3 OF 5

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TABLE 1 - DIMENSIONS FOR PARALLEL KEYS



(All dimensions are in millimetres)

WIDTH b	2	3	4	5	6	8	10	12	14	16	18	20	22	25	28	32	36	40	45	50	56	63	70	80	90	100
TOL ON b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-0.025	-0.030	-0.036	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	
HEIGHT h	2	3	4	5	6	7	8	8	9	10	11	12	14	14	16	18	20	22	25	28	32	36	40	45	50	
TOL ON h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	-0.025	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030	
S	MIN	0.16	0.16	0.16	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.60	0.60	0.60	0.60	1.00	1.00	1.00	1.00	1.00	1.60	1.60	2.50	2.50	
	MAX	0.25	0.25	0.25	0.40	0.40	0.40	0.60	0.60	0.60	0.60	0.80	0.80	0.80	0.80	1.20	1.20	1.20	1.20	1.20	1.20	2.00	2.00	3.00	3.00	
RANGE OF KEY LENGTH l	MIN	6	6	8	10	14	18	22	28	36	45	50	56	63	70	80	90	100	110	125	140	160	180	200	250	
	MAX	20	36	45	56	70	90	110	140	160	180	200	220	250	280	320	360	400	400	400	400	400	400	400	400	400



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41501

PAGE 4 OF 5

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TABLE 2 - PREFERRED LENGTH-SIZE COMBINATION FOR PARALLEL KEYS

(All dimensions in millimetres)

Preferred length (l)	2x2	3x3	4x4	5x5	6x6	8x7	10x8	12x8	14x9	16x10	18x11	20x12	22x14	25x14
10														
12			1.402											
14														
16														
18														
20				3.709	5.286			13.1						
22														
25				4.719		10.245			21.6					
28			3.412											
32					8.676			22.16						
36										41.0				
40				7.639	10.936				36.63		56.7	66.0		
45						19.045								
50										58.49				
56					15.436									
63									59.33					
70														
80									76.13					205.3
90														
100														
110														
125														
140														

WEIGHTS



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41501

PAGE 5 OF 5

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TABLE 2 - PREFERRED LENGTH-SIZE COMBINATION FOR PARALLEL KEYS (CONTN.)
(All dimensions in millimetres)

Preferred length(l)	22x14	25x14	28x16	32x18	36x20	40x22	45x25	50x28	56x32	63x32	70x36	80x40	90x45	100x50
63														
70														
80		205.3												
90														
100														
110														
125														
140														
160														
180														
200														
220														
250														
280														
320														
360														
400														

WEIGHTS

NOTE:

- 1 Weights are given in kg per 1000 numbers only
- 2 For stocked sizes refer BPS components booklet
- 3 Preferred lengths are in between the stepped bold lines



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41704

PAGE 1 OF 4

Based on IS: 549-1974

SPLIT PINS

1.0 SCOPE

Covers the requirements for Split Pins in the diameter range 0.6 to 20mm.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and tolerances	Table 1 of this standard	
Preferred length and size combination	Table 2 of this standard	
Material	Mild Steel Wire (Half round)	
Finish	Bright self colour finish	
Sampling and Acceptability	Indian standard	IS: 6821
General requirements	Pins shall comply with IS: 549 in respect of requirements not covered in this standard	

2.1 Referred Standards (Only the current versions are applicable)

IS: 549 Specification for Split Pins.

IS: 6821 Methods for sampling non-threaded fasteners

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STANDARDS SECTION
ENGINEERING AND DEVELOPMENT CENTRE
HPBP TIRUCHIRAPALLI

PREPARED
HPBP TIRUCHY

ISSUED
STANDARDS
BNGG

DATE
DEC 1986



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41704

PAGE 2 OF 4

3.0 DESIGNATION

A Split Pin to this standard of nominal diameter 5mm and nominal length 56mm shall be designated as:

3.1 On Drawings:

- i) Material Specification column: IS: 549
- ii) Description column : PIN SPLIT 5x56
- iii) Drawing Number column : 4170405056
- iv) Material Code column : 4170450056

3.2 Ordering Description

For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.

Split Pin 5x56 IS: 549

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PLANT STANDARD

HPBP TIRUCHIRAPALLI

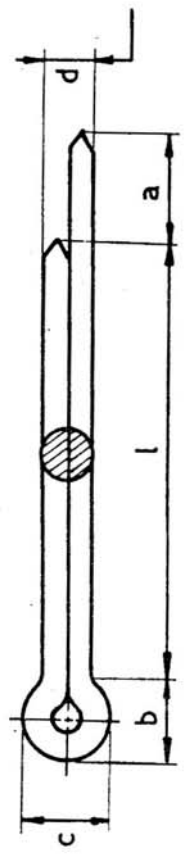
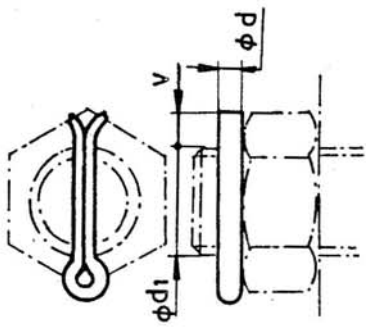
BPS: 41704

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TABLE 1 - DIMENSIONS FOR SPLIT PINS
(All dimensions in millimetres)



Dimensions	Nominal size																
	0.6	0.8	1.0	1.2	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	13	16	20	
d	Max	0.5	0.7	0.9	1.0	1.4	1.8	2.3	2.9	3.7	4.6	5.9	7.5	9.5	12.4	15.4	19.3
	Min	0.4	0.6	0.8	0.9	1.3	1.7	2.1	2.7	3.5	4.4	5.7	7.3	9.3	12.1	15.1	19.0
a	Max	1.6	1.6	1.6	2.5	2.5	2.5	3.2	4.0	4.0	4.0	4.0	4.0	6.3	6.3	6.3	6.3
	≈	2.0	2.4	3.0	3.0	3.2	4.0	5.0	6.4	8.0	10	12.6	16	20	26	32	40
c	Max	1.0	1.4	1.8	2.0	2.8	3.6	4.6	5.8	7.4	9.2	11.8	15	19	24.8	30.8	38.6
	Min	0.9	1.2	1.6	1.7	2.4	3.2	4.0	5.1	6.5	8.0	10.3	13.1	16.6	21.7	27.0	33.8
Corresponding diameter	Over	--	2.5	3.5	4.5	5.5	7.0	9.0	11	14	20	27	39	56	80	120	170
	Up to	2.5	3.5	4.5	5.5	7.0	9.0	11	14	20	27	39	56	80	120	170	--
Bolts	Over	--	2	3	4	5	6	8	9	12	17	23	29	44	69	110	160
	Up to	2	3	4	5	6	8	9	12	17	23	29	44	69	110	160	--
Clevis pins	Over	3	3	4	5	5	6	6	8	8	10	12	14	16	20	25	32
	Up to	3	3	4	5	5	6	6	8	8	10	12	14	16	20	25	32



PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS: 41704

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TABLE 2 - PREFERRED LENGTH-SIZE COMBINATION
FOR SPLIT PINS

(All dimensions in millimetres)

l Nom ±1/2 IT 17	Nominal size																
	0.6	0.8	1.0	1.2	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	13	16	20	
4																	
5																	
6																	
8																	
10																	
12																	
14																	
16						0.4											
18																	
20																	
22																	
25									2.7								
28																	
32										5.5							
36									3.6								
40										6.5							
45									4.6		11.4						
50																	
56									5.6	8.4	13.4						
63										9.2							
71											17.2						
80																	
90																	
100																	
112																	
125																	
140																	
160																	
180																	
200																	
224																	
250																	
280																	

WEIGHTS

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NOTE:

- 1 Weights are given in kg per 1000 numbers only
- 2 For stocked sizes refer BPS components booklet
- 3 Preferred lengths are in between the stepped bold lines