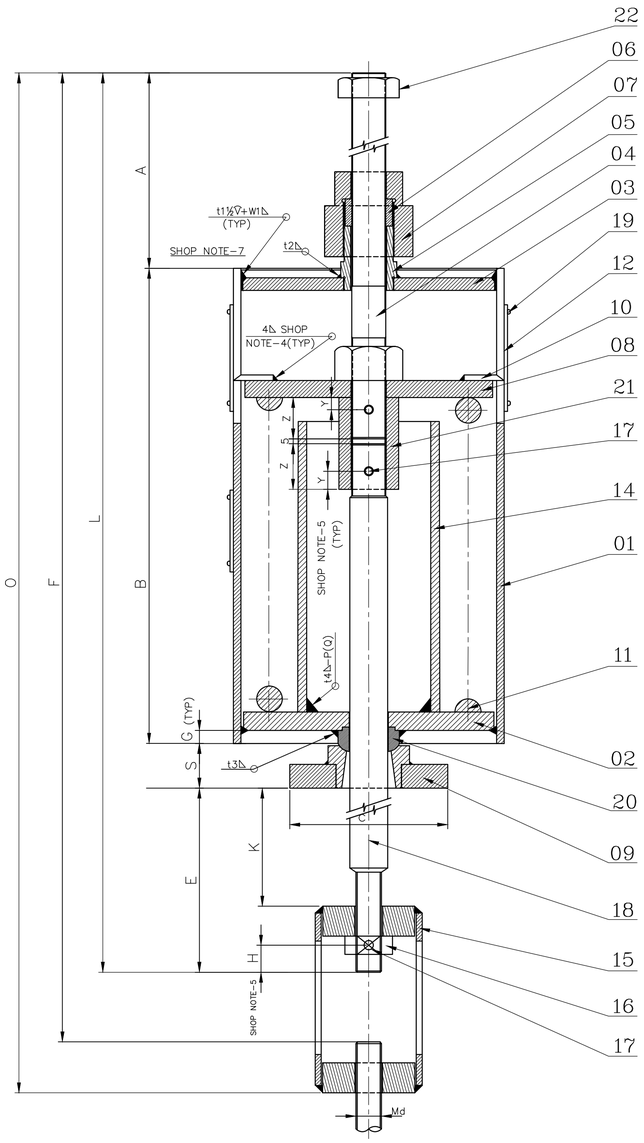
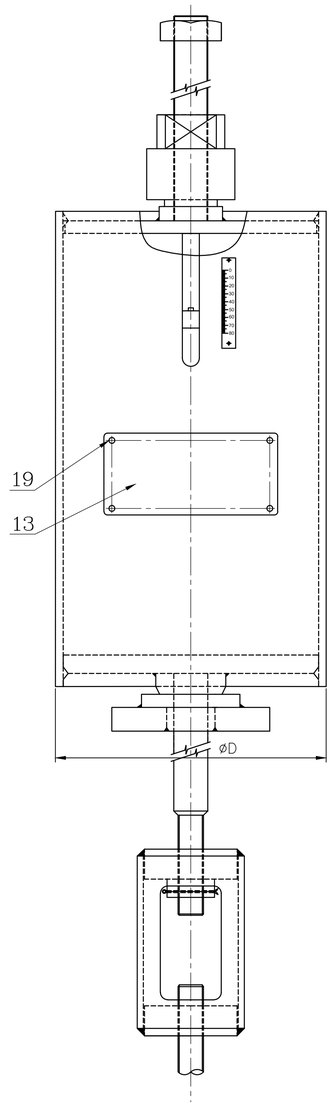
DRAWING NO: 1-12-000-01482





VAR. NO.	TYPE	BIN CODE	øD	B	O	MdxP	ASSY WEIGHT (kg)	A	C	E	F	G	H	L	S	Y	Z	K	t1-1/2▽+W1△	t2△	t3△	t4△-P(Q)
01	SAT 1-80	948210461002	113.9	204	1255	M14x2	6.1	156	70	750	1184	5	11	1134	24	5	10	717	4-1/2▽+4△	4△	4△	3△-20(25)
02	SAT 2-80	948210462002	166.5	201	1255	M14x2	9.2	155	70	755	1184	6	11	1134	23	5	10	722	4-1/2▽+5△	4△	4△	3△-20(40)
03	SAT 3-80	948210463002	113.9	271	1338	M14x2	7.9	156	80	766	1267	5	11	1217	24	5	10	733	4-1/2▽+4△	4△	4△	3△-15(20)
04	SAT 4-80	948210464002	113.9	288	1339	M14x2	9.1	156	80	750	1268	5	11	1218	24	5	10	717	4-1/2▽+4△	4△	4△	3△-20(25)
05	SAT 5-80	948210465002	166.5	298	1331	M27x3	16.3	173	80	725	1294	6	13	1219	23	7	14	679	4-1/2▽+5△	5△	4△	3△-20(35)
06	SAT 6-80	948210466002	166.5	298	1333	M27x3	17.5	172	80	728	1296	6	13	1221	23	7	14	682	5-1/2▽+5△	6△	5△	3△-20(35)
07	SAT 7-80	948210467002	219.1	305	1424	M27x3	30	190	90	725	1319	7	15	1244	24	9	18	675	6-1/2▽+6△	8△	5△	3△-30(50)
08	SAT 8-80	948210468002	166.5	397	1531	M27x3	33	205	110	725	1427	6	17	1352	25	10	20	671	5-1/2▽+5△	8△	5△	3△-25(35)
09	SAT 9-80	948210469002	219.1	460	1590	M27x3	55.6	202	110	725	1486	7	17	1411	24	10	20	671	6-1/2▽+6△	8△	6△	3△-30(40)
10	SAT 10-80	948210470002	219.1	493	1671	M27x3	76.4	227	130	725	1555	7	20	1480	35	13	26	654	6-1/2▽+6△	7△	6△	3△-30(50)
11	SAT 11-80	948210471002	323.9	473	1675	M27x3	125.6	253	150	725	1559	9	23	1484	33	16	32	648	8-1/2▽+8△	8△	8△	3△-40(80)
12	SAT 12-80	948210472002	355.6	530	1801	M36x3	221.2	296	200	725	1665	9	29	1590	39	21	42	616	8-1/2▽+8△	10△	8△	3△-40(80)
13	SAT 13-80	948210473002	406.4	639	1943	M48x3	331.1	328	200	725	1807	11	33	1732	40	25	50	608	10-1/2▽+10△	15△	8△	3△-50(80)

NOTES:

GENERAL:

1) FOR SPRING RATE AND SELECTION CHART REFER DRG.NO. 4-80-999-99068.
2) DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 56 MM, FOR ALL TYPES. DIMENSIONS E,F,L,O,K MAY CHANGE IN LINE WITH THE TOLERANCES/CHARACTERISTICS OF THE SPRING IN THE ASSEMBLY.

FOR SHOPS:

1. TRAVEL SCALE (ITEM-12) SHALL BE FIXED AT A POSTION, SUCH THAT THE POINTER (ITEM-10) READS 40MM IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 40MM TRAVEL GIVEN IN THE DRG 4-80-999-99068).

2. LOCKING:

a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE COLD POSITION INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM Nos.06 & 07 PRIOR TO DESPATCH.

3. MARKING:

a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG No., TYPE No., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM No.13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.

b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM No.12) WITH GREEN AND RED PAINTS RESPECTIVELY.

4. POINTERS (ITEM No.10) ARE TO BE WELDED TO SPRING PLATE (ITEM No.08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM No.01).

5. TOP & BOTTOM TIE RODS (ITEM Nos. 04 & 18) ARE TO BE MATCH DRILLED WITH COUPLING (ITEM No.21 ALSO BOTTOM TIE ROD (ITEM No.18) IS TO BE MATCH DRILLED WITH NUT (ITEM No.16) HOLE SIZES FOR THESE MATCH DRILLING ARE GIVEN BELOW.

TYPE	HOLE SIZE
SAT1-80 TO SAT7-80	DIA 4.5 MM
SAT8-80 TO SAT9-80	DIA 5.5 MM
SAT10-80 TO SAT15-80	DIA 7.0 MM

6. THE SLOTS ON TOP ARE TO BE FREE FROM WELD METAL (i.e). AFTER WELDING ALL ROUND, THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

7. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN.

FOR SITE:

1. DURING ERECTION:

a. THE SPRING HANGERS SHALL BE ERECTED SUCH THAT THE BEARING PLATE ASSY. (ITEM No.09) RESTS PERFECTLY ON TOP OF SUPPORTING STRUCTURE. AT THIS CONDITION THE BEARING PLATE ASSY IS TO BE WELDED TO THE SUPPORTING STRUCTURE.

2. BEFORE HYDRAULIC TEST:

a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST:

a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING ITEM Nos.06&07) AS PER THE FOLLOWING STEPS
   i. REMOVE NUT (ITEM No.22 AT THE TOP) FROM THE TOP TIE ROD (ITEM No.04)
   ii. LOOSEN HYD. LOCK NUT (ITEM No.07) AND THEN CENTERING NUT (ITEM No.06)
   iii. REMOVE HYD. LOCK NUT AND CENTERING NUT (ITEM No.07 & 06) FROM THE TOP TIE ROD (ITEM No.04)
   iv. THEN ASSEMBLE CENTERING NUT, HYD. LOCK NUT AND NUT (ITEM No.06,07 & 22) IN THE SAME SEQUENCE, SUCH THAT THE HYD. LOCK NUT IS HELD BETWEEN CENTERING NUT AND TOP NUT AND THE DISTANCE BETWEEN THE FREE END OF TOP TIE ROD AND TOP OF NUT SHALL BE APPROXIMATELY 5MM

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	22	NUT		STANDARD							2
	21	COUPLING		3-80-999-99188							1
	20	SPHERICAL WASHER		3-80-999-99187							1
	19	HAMMER DRIVEN SCREW		STANDARD							8
	18	BOTTOM TIE ROD		3-12-000-06351							1
	17	SPLIT PIN		STANDARD							3
	16	NUT		3-80-999-99152							1
	15	TURN BUCKLE		2-12-000-01853							1
	14	INNER PIPE GUIDE		3-80-999-99154							1
	13	NAME PLATE		3-80-999-99118							1
	12	TRAVEL SCALE		3-80-999-99117							2
	11	SPRING		2-80-999-99117							1
	10	POINTER		4-80-999-99047							2
	09	BEARING PLATE ASSY		3-80-999-99183							1
	08	SPRING PLATE		3-80-999-99182							1
	07	HYD.LOCK NUT		3-80-999-99153							1
	06	CENTERING NUT		2-80-999-99131							1
	05	BOTTOM SOCKET		2-80-999-99136							1
	04	TOP TIE ROD		3-80-999-99181							1
	03	TOP PLATE		3-80-999-99180							1
	02	BOTTOM PLATE		3-80-999-99179							1
	01	HOUSING		3-80-999-99175							1

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014
355-053

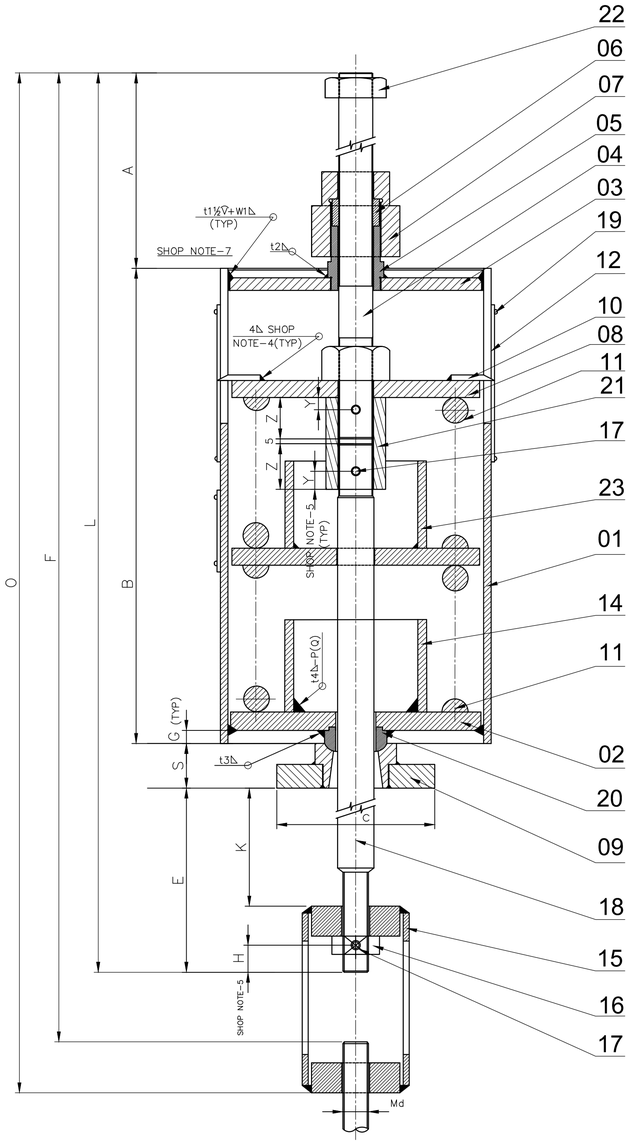
	NAME	SIGNATURE	DATE
DRN	R.GOBI		15.12.2014
CHD	THINESH KUMAR		15.12.2014
APPD	R.T.		16.12.2014

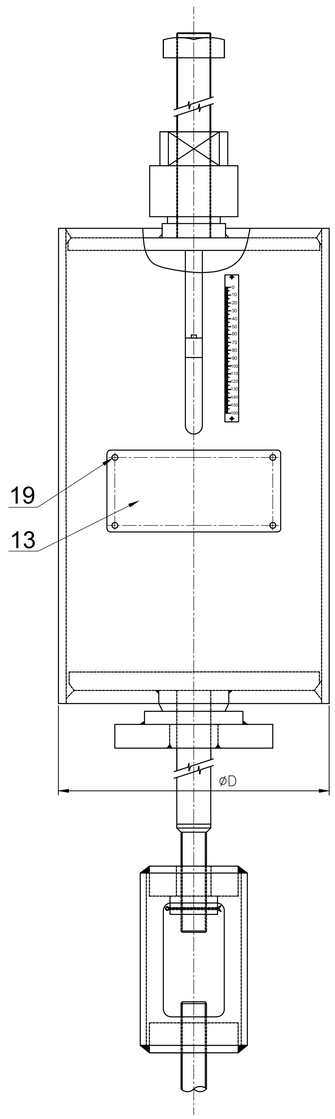
DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) | REF TO ASSY / OLD DWG 1-80-999-99006

TITLE: VARIABLE LOAD HANGERS (TYPE SAT 80)

DRAWING NO : 1-12-000-01482 | REV 00

DRAWING NO: 1-12-000-01483





VAR. NO.	TYPE	BIN CODE	øD	B	O	MdxP	ASSY WEIGHT (kg)	A	C	E	F	G	H	L	S	Y	Z	K	t1−1/2▽+W1△	t2△	t3△	t4△−P(Q)
01	SAT 1−160	948210476002	113.9	378	1525	M14x2	9.1	252	70	750	1454	5	11	1404	24	5	10	717	4−1/2▽+4△	4△	4△	3△−20(25)
02	SAT 2−160	948210477002	166.5	370	1525	M14x2	14.7	251	70	760	1454	6	11	1404	24	5	10	727	4−1/2▽+5△	4△	4△	3△−20(40)
03	SAT 3−160	948210478002	113.9	512	1692	M14x2	12.8	252	80	783	1621	5	11	1571	24	5	10	750	4−1/2▽+4△	4△	4△	3△−15(20)
04	SAT 4−160	948210479002	113.9	546	1693	M14x2	15.3	252	80	750	1622	5	11	1572	24	5	10	717	4−1/2▽+4△	4△	4△	3△−20(25)
05	SAT 5−160	948210480002	166.5	561	1690	M27x3	26.6	269	80	725	1653	6	13	1578	23	7	14	679	4−1/2▽+5△	5△	4△	3△−20(35)
06	SAT 6−160	948210481002	166.5	557	1692	M27x3	28.4	268	80	732	1655	6	13	1580	23	7	14	686	5−1/2▽+5△	6△	5△	3△−20(35)
07	SAT 7−160	948210482002	219.1	564	1779	M27x3	48.9	286	90	725	1674	7	15	1599	24	9	18	675	6−1/2▽+6△	8△	5△	3△−30(50)
08	SAT 8−160	948210483002	166.5	743	1973	M27x3	54.9	301	110	725	1869	6	17	1794	25	10	20	671	5−1/2▽+5△	8△	5△	3△−25(35)
09	SAT 9−160	948210484002	219.1	863	2089	M27x3	95.9	298	110	725	1985	7	17	1910	24	10	20	671	6−1/2▽+6△	8△	6△	3△−30(40)
10	SAT 10−160	948210485002	219.1	916	2190	M27x3	126.4	323	130	725	2074	7	20	1999	35	13	26	654	6−1/2▽+6△	7△	6△	3△−30(50)
11	SAT 11−160	948210486002	323.9	867	2165	M27x3	220.9	349	150	725	2049	9	23	1974	33	16	32	648	8−1/2▽+8△	8△	8△	3△−40(80)
12	SAT 12−160	948210487002	355.6	964	2331	M36x3	364.9	392	200	725	2195	9	29	2120	39	21	42	616	8−1/2▽+8△	10△	8△	3△−40(80)
13	SAT 13−160	948210488002	406.4	1166	2566	M48x3	554.4	424	200	725	2430	11	33	2355	40	25	50	608	10−1/2▽+10△	15△	8△	3△−50(80)

NOTES:

GENERAL:

1) FOR SPRING RATE AND SELECTION CHART REFER DRG.No. 4−80−999−99068.
2) DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 56 MM, FOR ALL TYPES. DIMENSIONS E,F,L,O,K MAY CHANGE IN LINE WITH THE TOLERANCES/CHARACTERISTICS OF THE SPRING IN THE ASSEMBLY.

FOR SHOPS:

1) TRAVEL SCALE (ITEM No.12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM.No.10) READS 40MM IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 40MM TRAVEL GIVEN IN THE DRG.No. 4−80−999−99068).

2. LOCKING:

a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE COLD POSITION INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM Nos.06 & 07 PRIOR TO DESPATCH.

3. MARKING:

a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG No., TYPE No., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM No.13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.

b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM No.12) WITH GREEN AND RED PAINTS RESPECTIVELY.

4. POINTERS (ITEM No.10) ARE TO BE WELDED TO SPRING PLATE (ITEM No.08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM No.01).

5. TOP & BOTTOM TIE RODS (ITEM No.04&18)ARE TO BE MATCH DRILLED WITH COUPLING (ITEM No 21) ALSO BOTTOM TIE ROD (ITEM No.18) IS TO BE MATCH DRILLED WITH NUT(ITEM No.16) HOLE SIZES FOR THESE MATCH DRILLING ARE GIVEN BELOW.

TYPE	HOLE SIZE
SAT1−160 TO SAT7−160	DIA 4.5 MM
SAT8−160 TO SAT9−160	DIA 5.5 MM
SAT10−160 TO SAT15−160	DIA 7.0 MM

6. THE SLOTS ON TOP ARE TO BE FREE FROM WELD METAL (i.e). AFTER WELDING ALL ROUND THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

7. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN.

FOR SITE:

1. DURING ERECTION:

a. THE SPRING HANGERS SHALL BE ERECTED SUCH THAT THE BEARING PLATE ASSY. (ITEM No.09) RESTS PERFECTLY ON TOP OF SUPPORTING STRUCTURE. AT THIS CONDITION THE BEARING PLATE ASSY IS TO BE WELDED TO THE SUPPORTING STRUCTURE.

2. BEFORE HYDRAULIC TEST:

a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST:

a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING (ITEM Nos.06&07) AS PER THE FOLLOWING STEPS
   i. REMOVE NUT (ITEM No.22 AT THE TOP) FROM THE TOP TIE ROD(ITEM No.04)
   ii. LOOSEN HYD.LOCK NUT (ITEM No.07) AND THEN CENTERING NUT (ITEM No.06)
   iii. REMOVE HYD. LOCK NUT AND CENTERING NUT (ITEM No.07 & 06) FROM THE TOP TIE ROD (ITEM No.04)
   iv. THEN ASSEMBLE CENTERING NUT, HYD.LOCK AND NUT (ITEM No.06,07&22) IN THE SAME SEQUENCE, SUCH THAT THE HYD. LOCK NUT IS HELD BETWEEN CENTERING NUT AND TOP NUT AND THE DISTANCE BETWEEN THE FREE END OF TOP TIE ROD AND TOP OF NUT SHALL BE APPROXIMATELY 5MM.

23	MIDDLE PLATE ASSY	2−80−999−99129	1
22	NUT	STANDARD	2
21	COUPLING	3−80−999−99188	1
20	SPHERICAL WASHER	3−80−999−99187	1
19	HAMMER DRIVEN SCREW	STANDARD	8
18	BOTTOM TIE ROD	3−12−000−06486	1
17	SPLIT PIN	STANDARD	3
16	NUT	3−80−999−99152	1
15	TURN BUCKLE	2−12−000−01853	1
14	INNER PIPE GUIDE	3−80−999−99154	1
13	NAME PLATE	3−80−999−99118	1
12	TRAVEL SCALE	3−80−999−99119	2
11	SPRING	2−80−999−99117	1
10	POINTER	4−80−999−99047	2
09	BEARING PLATE ASSY	3−80−999−99183	1
08	SPRING PLATE	3−80−999−99182	1
07	HYD.LOCK NUT	3−80−999−99153	1
06	CENTERING NUT	2−80−999−99131	1
05	BOTTOM SOCKET	2−80−999−99136	1
04	TOP TIE ROD	3−80−999−99189	1
03	TOP PLATE	3−80−999−99180	1
02	BOTTOM PLATE	3−80−999−99179	1
01	HOUSING	3−80−999−99176	1

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	GS	ZONE
					VAR NO	MATERIAL SPECN		DI	QUANTITY		

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

BHEL 355-053

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

	NAME	SIGNATURE	DATE
DRN	R.GOBI		15.12.2014
CHD	THINESH KUMAR		15.12.2014
APPD	R.T		16.12.2014

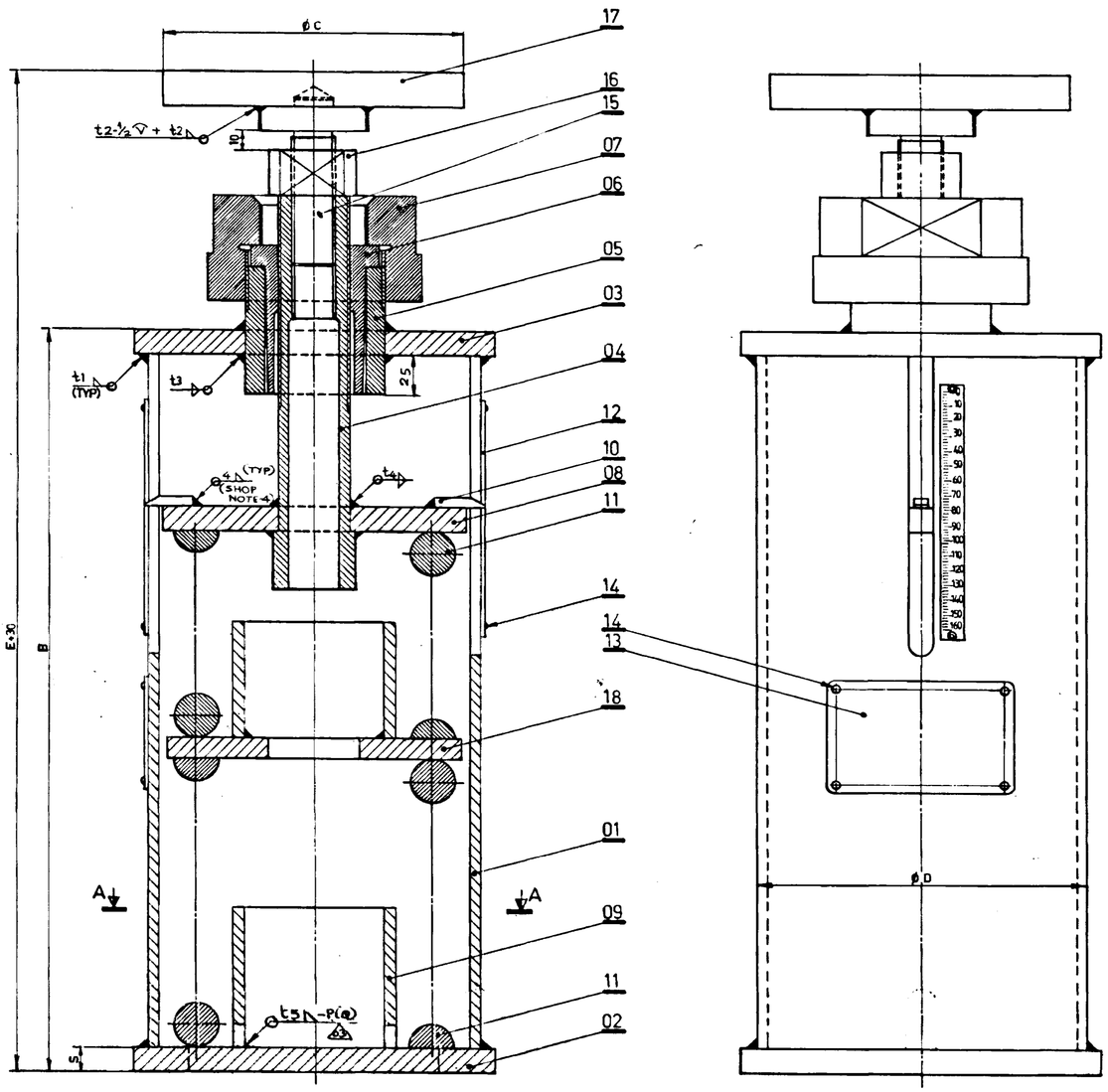
DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) | REF TO ASSY / OLD DWG 1−80−999−99007

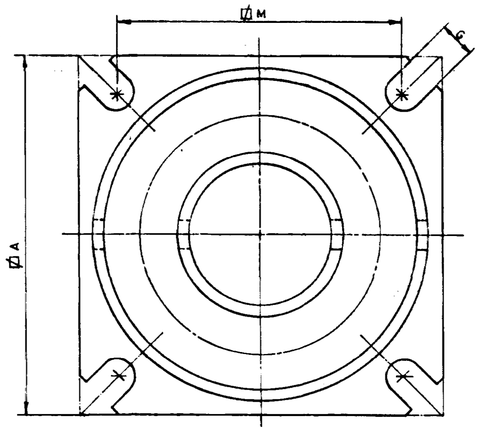
TITLE: VARIABLE LOAD HANGERS (TYPE SAT 160)

DRAWING NO : 1−12−000−01483 | REV 00

DRAWING No. 60066-666-08 -1

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)





SECTION-A A

VAR NO	TYPE	BIN CODE	D	B	E	ASSY. WT (kg)	M	A	C	S	G		t1Δ	t2	t3Δ	t4Δ	t5Δ-P(@)	REMARKS
01	SS- 1-160	94-821-446-00	113.9	383	783	10.838	115	160	110	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(25)	
02	SS- 2-160	94-821-447-00	166.5	373	753	17.269	160	210	110	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(40)	
03	SS- 3-160	94-821-448-00	113.9	517	899	15.054	115	160	150	5	15		3Δ	1.5	3Δ	3Δ	3Δ-15(20)	
04	SS- 4-160	94-821-449-00	113.9	551	933	17.491	115	160	150	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(25)	
05	SS- 5-160	94-821-450-00	166.5 ⚠1	561	945	30.184	160 ⚠2	210 ⚠2	150	5	15		3Δ	1.5	3Δ	4Δ	3Δ-20(35)	
06	SS- 6-160	94-821-451-00	166.5	557	938	30.786	160	210	150	6	15		3Δ	1.5	3Δ	4Δ	3Δ-20(35)	
07	SS- 7-160	94-821-452-00	219.1	559	948	53.992	205	260	200	8	19		4Δ	1.5	3Δ	5Δ	3Δ-30(50)	
08	SS- 8-160	94-821-453-00	166.5	737	1137	59.042	160	210	200	10	19		4Δ	2	4Δ	6Δ	3Δ-25(35)	
09	SS- 9-160	94-821-454-00	219.1	855 ⚠1	1253 ⚠1	100.869 ⚠1	205	260	220	12	23		4Δ	2	4Δ	6Δ	3Δ-30(40)	
10	SS-10-160	94-821-455-00	219.1	903	1305	124.593	205	260	220	16	23		4Δ	2	6Δ	8Δ	3Δ-30(50)	
11	SS-11-160	94-821-456-00	323.9	845	1258	220.541	295	370	220	16	28		6Δ	3	6Δ	8Δ	3Δ-40(80)	
12	SS-12-160	94-821-457-00	355.6	933	1367	352.024	320	400	260	20	28		6Δ	4	8Δ	10Δ	3Δ-40(80)	
13	SS-13-160	94-821-458-00	406.4	1124	1571	533.502	365	450	290	20	33		6Δ	5	10Δ	10Δ	3Δ-50(80)	

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG. NO. 4-80-999-99068.

⚠3 ~~BILL OF MATERIALS: FOR TYPES SS1-160 TO SS15-160 REFER DUMMY DWG. SS16.5-80-999-99140 TO 4-80-999-99154 RESPECTIVELY.~~

3. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 112 MM. FOR ALL TYPES. DIMENSION E MAY ⚠6 CHANGE IN LINE WITH THE TOLERANCES / CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY.

FOR SHOPS :

⚠4 1. TRAVEL SCALE (ITEM-12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM-10) READS 80 mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 80 mm TRAVEL - GIVEN IN DRG. 4-80-999-99068).

2. LOCKING :

⚠5 a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE 'COLD POSITION' INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS. 06 & 07 PRIOR TO DESPATCH..

3. MARKING :

a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG NO., TYPE NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.

b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO. 12) WITH GREEN AND RED PAINTS RESPECTIVELY..

4. POINTERS (ITEM NO. 10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO. 08) SUCH THAT THEY PROTRUDE BY 2 TO 4 mm OUTSIDE THE HOUSING (ITEM NO. 01).

⚠5 ⚠3 ~~ZINC RICH PRIMER SHALL BE APPLIED LOCALLY AFTER WELDING. HOWEVER REQUIRED SURFACE PREPARATION SHALL BE DONE AS PER SPECIFICATION TO ENSURE GOOD QUALITY WELD JOINTS. COLOUR OF ITEM NO. 03 - TRAVEL SCALE SHALL BE DIFFERENT FROM THAT OF SPRING. SPRING SHALL BE PAINTED AT THE SHOPS AS PER SPECIFICATION.~~

FOR SITE :

1. DURING ERECTION:
WHILE LOCATING THE SPRING HANGER IN POSITION THE FOLLOWING STEPS SHALL BE FOLLOWED.
a. REDUCE THE OVERALL HEIGHT (E) OF THE SPRING HANGER BY 5 TO 10 MM, BY ROTATING THE DISC (ITEM NO. 17).
b. INSERT THE SPRING HANGER IN POSITION.
c. ROTATE THE DISC (ITEM NO. 17) UNTIL IT IS IN FULL CONTACT WITH THE PEDESTAL WELDED TO THE PIPE.
d. BRING DOWN THE LOCK NUT (ITEM NO. 16) SUCH THAT IT IS IN CONTACT WITH THE SPINDLE PIPE (ITEM NO. 04).

2. BEFORE HYDRAULIC TEST :
a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD POSITION ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST :
a. RELEASE THE HYD. LOCK NUT (ITEM NO. 07) AND SCREW IT ON THE THREADED PORTION OF ADJUSTMENT BOLT (ITEM NO. 15), BELOW THE DISC.
b. RELEASE THE CENTERING NUT (ITEM NO. 06) TO THE TOPMOST POSSIBLE POINT.

NOTES FOR SHOPS (CONTD):

~~6. THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT SUITABLY THE GALVANISED/CHROMOTED COMPONENTS WITH A PAINTBRUSH.~~

⚠3 ⚠4 6. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN.

ITEM NO.	DESCRIPTION	DRG. NO.	QTY	
18	MIDDLE PLATE ASSY	2-80-999-99129	1	
17	DISC	3-80-999-99174	1	
16	LOCK NUT	3-80-999-99200	1	
15	ADJUSTMENT BOLT	3-80-999-99197	1	
14	HAMMER DRIVEN SCREW	STANDARD	8	
13	NAME PLATE	3-80-999-99118	1	
12	TRAVEL SCALE	3-80-999-99119	2	
11	SPRING	2-80-999-99117	2	
10	POINTER	4-80-999-99047	2	
09	INNER PIPE GUIDE	3-80-999-99154	1	
08	SPRING PLATE	3-80-999-99198	1	
07	HYD. LOCK NUT	3-80-999-99192	1	
06	CENTERING NUT	3-80-999-99201	1	
05	BOTTOM SOCKET	3-80-999-99202	1	
04	SPINDLE PIPE	3-80-999-99206	1	
03	TOP PLATE	3-80-999-99199	1	
02	BOTTOM PLATE	3-80-999-99196	1	
01	HOUSING	3-80-999-99178	1	

REV	DATE	ALTD	APPD	ALTERED / REMARKS
06	11/9/2005		APPD: MMK -Sd-	• GENERAL NOTE 3 ALTD. • SHOP NOTE 1, 2a ALTD. • TITLE ALTD FROM 'VARIABLE SPRING HANGERS' TO 'VARIABLE LOAD HANGERS'.
05	22/11/95		APPD	SHOP NOTE 4 ALTERED FOR POINTERS.
04	22/11/95		APPD	SHOP NOTE-6 ALTERED FOR PAINTING
03	13/2/94	ALTERED:	APPROVED:	GENERAL NOTE NO-2 DELETED. NOTE NO. 5 (FOR SHOPS) DELETED. NOTE NO. 6 (FOR SHOPS) CHANGED. WELD LENGTH ALTERED DUE WELDING ITEM NO. 08 & 09 AND INCLUDED IN THE TABLE.
02	1-8-90	CHECKED -Sd-		SHOP NOTE No. 6 ADDED
01	27/6/89	ALTERED CHECKED -Sd-		FOR VAR NO. 09 - DIMENSIONS B&E AND WEIGHT ALTERED. FOR VAR NO. 05 - DIMENSIONS D,A & M - ALTERED. NOTE 5 (FOR SHOPS) REVISED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF ITEMS
DRN.	P.SVEL.		06.09.88	
CHD	M.M.MANI.			
APPD	J.JUDE.		27.9.88	

DEPT.	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
CODE C/M/F		NTS			

TITLE: VARIABLE LOAD HANGERS (Type: SS 160)

CARD CODE: U 01

DRAWING No.: 1-80-999-99009.

REV.: 06

TRACING REPRINTED WITH REV-05 "TIF" FILE & REV-06 DETAILS INCORPORATED ON 20-09-07

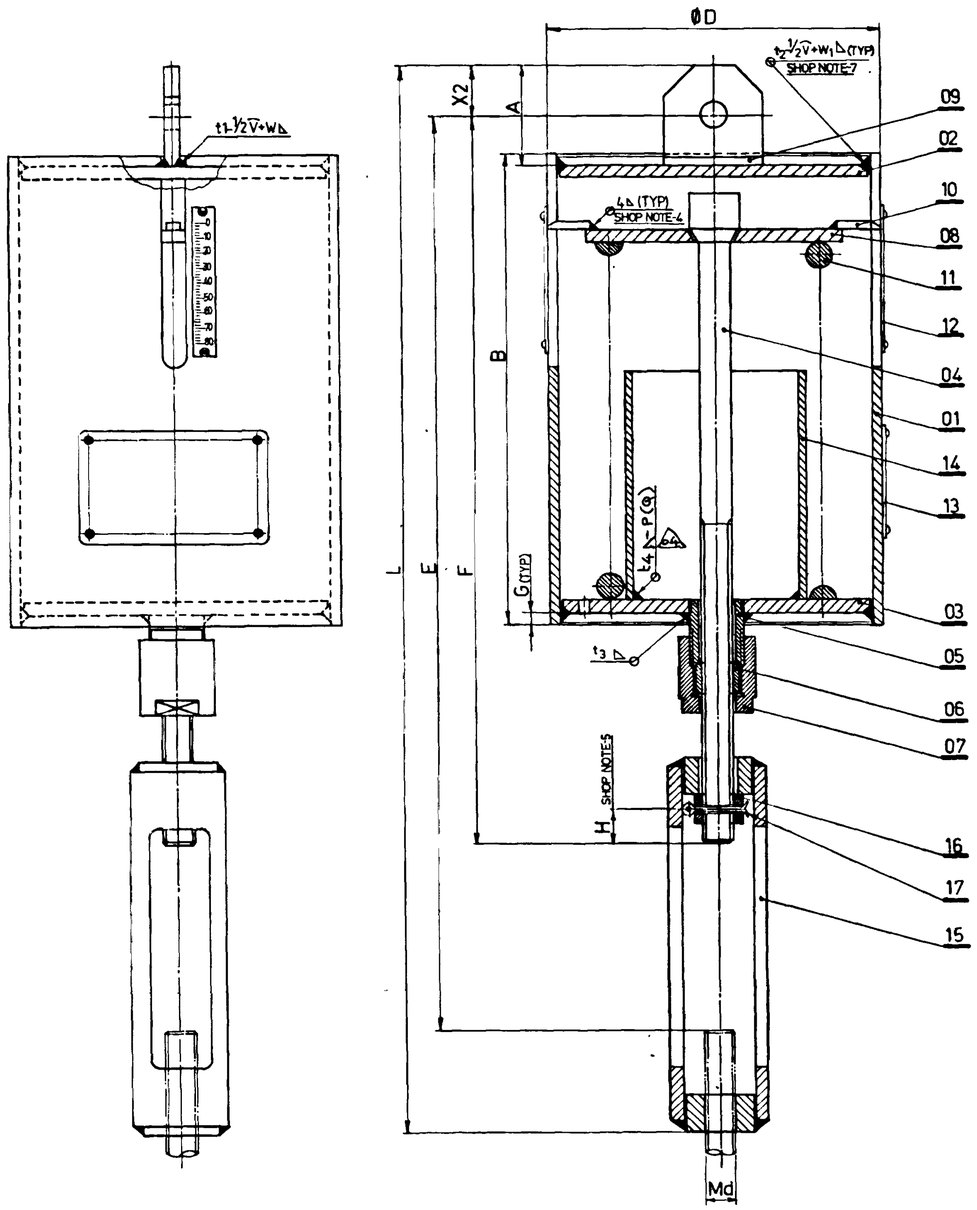
SIZE A1

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING NO 1-80-999-99002

08-271/C

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



VAR NO	TYPE	BIN CODE	D	B	L	Md	RSSY WEIGHT (Kg)	A	F	E	G	H	X2	t3 Δ	t1-½V+W Δ	t2-½V+W1 Δ	t4 Δ-P(Q) ⟨4⟩	REMARKS
01	SH 1-80	94-821-401-00	113.9	219	477	M12x1.75	5.157	50	336	386	5.0	11	20	4Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-20(25)	
02	SH 2-80	94-821-402-00	186.5	216	472	M12x1.75	8.814	50	331	381	6.0	11	20	4Δ	2.5-1/2 V+4Δ	4-½V+5Δ	3Δ-20(40)	
03	SH 3-80	94-821-403-00	113.9	286	544	M12x1.75	6.926	50	403	453	5.0	11	20	4Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-15(20)	
04	SH 4-80	94-821-404-00	113.9	303	561	M12x1.75	8.165	50	420	470	5.0	11	20	4Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-20(25)	
05	SH 5-80	94-821-405-00	186.5	310	608	M16x2.0	14.806	80	448	498	6.0	13	30	5Δ	3-1/2 V+5Δ	4-½V+5Δ	3Δ-20(35)	
06	SH 6-80	94-821-406-00	186.5	310	608	M16x2.0	16.055	80	448	498	6.0	13	30	6Δ	3-1/2 V+5Δ	5-½V+5Δ	3Δ-20(35)	
07	SH 7-80	94-821-407-00	219.1	314	701	M20x2.5	27.612	70	486	561	7.0	15	35	8Δ	4-1/2 V+8Δ	6-½V+6Δ	3Δ-30(50)	
08	SH 8-80	94-821-408-00	166.5	403	822	M24x3.0	29.246	80	602	677	6.0	17	40	8Δ	5-1/2 V+8Δ	5-½V+5Δ	3Δ-25(35)	
09	SH 9-80	94-821-409-00	219.1	466 ⟨4⟩	883 ⟨4⟩	M24x3.0	51.936 ⟨4⟩	80	663 ⟨4⟩	738 ⟨4⟩	7.0	17	40	8Δ	5-1/2 V+8Δ	6-½V+6Δ	3Δ-30(40)	
10	SH10-80	94-821-410-00	219.1	494	989	M30x3.5	69.563	100	748	823	7.0	20	50	7Δ	8-1/2 V+6Δ	6-½V+6Δ	3Δ-30(50)	
11	SH11-80	94-821-411-00	323.9	469	1012	M36x4.0	122.552	120	761	836	9.0	23	80	8Δ	8-1/2 V+8Δ	8-½V+8Δ	3Δ-40(80)	
12	SH12-80	94-821-412-00	355.6	517	1193	M48x5.0	200.531	154	905	980	9.0	29	77	10Δ	10-1/2 V+8Δ	8-½V+8Δ	3D-40(80)	
13	SH13-80	94-821-413-00	408.4	619	1363	M56x4.0	303.837	180	1062	1137	11.0	33	90	15Δ	12.5-1/2 V+8Δ	10-½V+10Δ	3D-50(80)	

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG.NO. 4-80-999-99068
2. [redacted]
3. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 58 MM FOR ALL TYPES. DIMENSIONS L,E,F MAY CHANGE IN LINE WITH THE TOLERANCES/CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY. ⟨7⟩

FOR SHOPS :

1. TRAVEL SCALE (ITEM 12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM 10) READS 40 mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 40 mm TRAVEL - GIVEN IN DRG 4-80-999-99068). ⟨7⟩

2. LOCKING :
   a. TYPES SH1-80 TO SH9-80 SHALL BE LOCKED IN 'ZERO' ⟨7⟩ POSITION USING ITEM NO. 08 & 07 PRIOR TO DESPATCH. (i.e. WITH POINTER AT '0' READING)
   b. ⟨7⟩ TYPES SH10-80 & ABOVE SHALL BE PRECOMPRESSED TO THE 'COLD POSITION' INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS. 08 & 07 PRIOR TO DESPATCH..

3. MARKING :
   a. FOR TYPES SH10-80 & ABOVE, HANGER TAG NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS..
   b. FOR TYPES SH10-80 & ABOVE, COLD AND HOT SETTING POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO. 12) WITH GREEN AND RED PAINTS RESPECTIVELY.
   c. TYPE NUMBERS SHALL BE PUNCHED ON ALL HANGERS.

4. POINTERS (ITEM NO. 10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO. 08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM NO. 01). ⟨4⟩

5. SPINDLE BOLT AND NUT (ITEM NOS. 04 & 18) SHALL BE MATCH-DRILLED, FOR EACH AND EVERY ASSEMBLY, TO THE HOLE SIZE INDICATED BELOW :

TYPE	HOLE SIZE
SH1-80 TO SH7-80	DIA 4.5 MM
SH8-80 & SH9-80	DIA 5.5 MM
SH10-80 TO SH15-80	DIA 7.0 MM

⟨4⟩ ⟨8⟩ [redacted]

7. THE SLOTS ON TOP ARE TO BE FREE FROM WELD METAL (i.e) AFTER WELDING ALL ROUND, THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

FOR SITE :

1. BEFORE HYDRAULIC TEST :
   a. TYPES SH1-80 TO SH9-80 : HANGERS SHALL BE ADJUSTED TO THE COLD SET LOAD INDICATED IN THE CONTRACT DOCUMENTS FOR THE RESPECTIVE HANGER TAG NOS, PRIOR TO ERECTION. AT THIS SET LOAD, HANGERS SHALL BE LOCKED USING ITEM NOS. 08 & 07.
   b. TYPES SH10-80 & ABOVE : HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

2. AFTER HYDRAULIC TEST :
   a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING ITEM NOS. 08 & 07 UNTIL THEY ARE SEATED ON TURN BUCKLE (ITEM NO. 15).

3. MARKING FOR SH1-80 TO SH9-80 :
   a. HANGER TAG NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON DETAILS INDICATED IN THE CONTRACT DOCUMENTS.
   b. COLD AND HOT SETTING POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE WITH GREEN AND RED PAINTS RESPECTIVELY.

NOTES FOR SHOPS (CONTD)

[redacted] ⟨4⟩ ⟨4A⟩ ⟨5⟩

8. THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVER COAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT SUITABLY THE GALVANISED/CHROMOTISED COMPONENTS WHILE PAINTING. ⟨4A⟩ ⟨5⟩

8. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN. ⟨8⟩

REFERENCE DRAWINGS :-

ITEM NO.	DESCRIPTION	DRAWING NO.	QTY	
18	HAMMER DRIVEN SCREW	STANDARD	8	
17	SPLIT PIN	STANDARD	1	
16	NUT	3-80-999-99152	1	
15	TURN BUCKLE	2-80-999-99140	1	
14	INNER PIPE GUIDE	3-80-999-99154	1	
13	NAME PLATE	3-80-999-99118	1	
12	TRAVEL SCALE	3-80-999-99117	2	
11	SPRING	2-80-999-99117	1	
10	POINTER	4-80-999-99047	2	
09	LUG PLATE	2-80-999-99138	1	
08	SPRING PLATE	2-80-999-99133	1	
07	HYD. LOCK NUT	3-80-999-99153	1	
06	CENTERING NUT	2-80-999-99131	1	
05	BOTTOM SOCKET	2-80-999-99136	1	
04	SPINDLE BOLT	2-80-999-99137	1	
03	BOTTOM PLATE	2-80-999-99135	1	
02	TOP PLATE	2-80-999-99130	1	
01	HOUSING	3-80-999-99157	1	

REV	DATE	ALTD/APPD	DESCRIPTION
07	11/11/2009	APPD. Amk - SK	GENERAL NOTE 3 ALTERED. + SHOP NOTES 1, 2a, 2b ALTERED. "TITLE CHANGED FROM "VARIABLE SPRING HANGERS" TO "VARIABLE LOAD HANGERS"
06	29/4/2008	APPD	SHOP NOTE 4 ALTERED FOR POINTERS.
05	22/12/06	APPD	SHOP NOTE 8 ALTERED FOR PAINTING.
04	15/2/06	APPROVED	GENERAL NOTE NO. 2 DELETED. NOTE NO. 6 (FOR SHOPS) DELETED. NOTE NO. 8 (FOR SHOPS) CHANGED. WELD LENGTH ALTERED FOR WELDING ITEM NO. 03 & 11, AND INCLUDED IN THE TABLE.
03	27/6/05	CHECKED	FOR VAR. NO. 09 - DIMENSIONS B, L, E & F AND WEIGHT ALTERED. NOTE 6 (FOR SHOPS) REVISED. REV 02 ALTERED. REV 01 CHECKED.
02	20.08.88	CHECKED	WELD TYPE FOR TOP & BOTTOM PLATE TO HOUSING CHANGED. DIMENSIONS 'B' & 'E', WELD 'Z' AND ASSY. WEIGHT ALTERED. SHOP NOTE- 7 ADDED.
01			NOTE 8 & MARKED UNDER SHOP NOTES

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	PSakthivel		01.07.88
CHD	V. Venkatesan		22.07.88
APPD	J. JODE		22.07.88

DEPT	GRADE OF UNTOL FINE	SCALE	WEIGHT (Kg)	REF TO ASSY/ OLD DRG.	ITEM No.
CODE C/M/F		NTS			

TITLE: VARIABLE LOAD HANGERS (Type: SH 80) ⟨7⟩

CARD CODE: U 01

DRAWING No.: 1-80-999-99002.

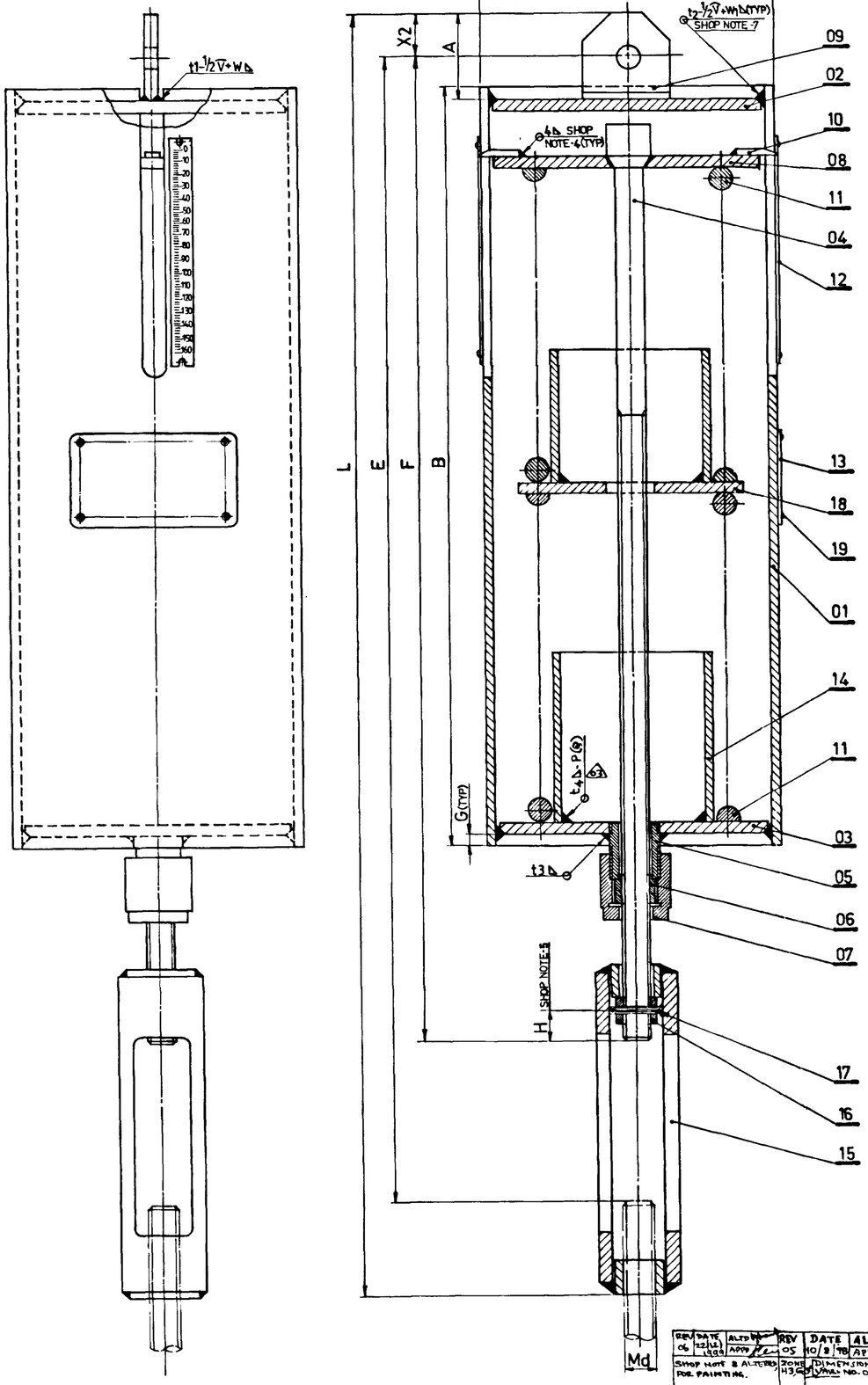
REV.: 07

TRACING REPRINTED WITH REV 01 "TITLE" TITLE & REV 07 DETAILS INCORPORATED ON 20-07-07

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

CS-227/C

DRAWING No. 1-80-999-99003



VAR NO	TYPE	BIN CODE	D	B	L	Md	ASSY WEIGHT (Kg)	A	F	E	G	H	X2	t3Δ	t1-1/2 V+W4Δ	t2-1½V+W1Δ	t4Δ-P(@) 03
01	SH 1-160	94-821-416-00	113.9	393	659	M12x1.75	8,156	50	518	568	5 02	11	20	4 Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-20(25)
02	SH 2-160	94-821-417-00	166.5	385	649	M12x1.75	14,226	50	508	558	6 02	11	20	4 Δ	2.5-1/2 V+4Δ	4-½V+5Δ	3Δ-20(40)
03	SH 3-160	94-821-418-00	113.9	527	793	M12x1.75	11,060	50	652	702	5 02	11	20	4 Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-15(20)
04	SH 4-160	94-821-419-00	113.9	561	827	M12x1.75	14,169	50	686	736	5 02	11	20	4 Δ	2.5-1/2 V+4Δ	4-½V+4Δ	3Δ-20(25)
05	SH 5-160	94-821-420-00	188.5	573	861 03	M16x2.0	25,018	60	719	769	6 02	13	30	5 Δ	3-1/2 V+5Δ	4-½V+5Δ	3Δ-20(35)
06	SH 6-160	94-821-421-00	166.5	569	875	M16x2.0	26,839	60	715	765	6 02	13	30	6 Δ	3-1/2 V+5Δ	5-½V+5Δ	3Δ-20(35)
07	SH 7-160	94-821-422-00	219.1	573	968	M20x2.5	46,336	70	753	828	7 02	15	35	8 Δ	4-1/2 V+6Δ	6-½V+6Δ	3Δ-30(50)
08	SH 8-160	94-821-423-00	166.5	709	1176	M24x3.0	50,848	80	956	1031	6 02	17	40	8 Δ	5-1/2 V+8Δ	5-½V+5Δ	3Δ-25(35)
09	SH 9-160	94-821-424-00	219.1	869 03	1296 03	M24x3.0	92.843 03	80	1076 03	1149 03	7 02	17	40	8 Δ	5-1/2 V+6Δ	6-½V+6Δ	3Δ-30(40)
10	SH10-160	94-821-425-00	219.1	917	1420	M30x3.5	118,865	100	1179	1254	7 02	20	50	7 Δ	6-1/2 V+6Δ	6-½V+6Δ	3Δ-30(50)
11	SH11-160	94-821-426-00	323.9	863	1414	M36x4.0	210,309	120	1163	1298	9 02	23	60	8 Δ	8-1/2 V+8Δ	8-½V+8Δ	3Δ-40(80)
12	SH12-160	94-821-427-00	355.6	951	1635	M48x5.0	342,994	154	1347	1422	9 02	29	77	10 Δ	10-1/2 V+8Δ	8-½V+8Δ	3Δ-40(80)
13	SH13-160	94-821-428-00	406.4	1146	1898	M56x4.0	525,352	180	1597	1672	11 02	33	90	15 Δ	12.5-1/2 V+8Δ	10½V+10Δ	3Δ-50(80)

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG. NO. 4-80-999-99068. 03

~~2. BILL OF MATERIALS FOR THESE SH-160 TO SH13-160 ARE GIVEN IN~~ 03
~~DRG. 4-80-999-9073 TO 4-80-999-9085 RESPECTIVELY.~~

3. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 112 MM. FOR ALL TYPES. DIMENSIONS L,E,F MAY CHANGE IN LINE WITH THE TOLERANCES / CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY 02

FOR SHOPS :

1. TRAVEL SCALE (ITEM-12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM-10) READS 80 mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 80 mm TRAVEL - GIVEN IN DRG 4-80-999-99068). 08

2. LOCKING :

a. TYPES SH1-160 TO SH9-160 SHALL BE LOCKED IN 'ZERO' 08 POSITION USING ITEM NO. 06 & 07 PRIOR TO DESPATCH (i.e. WITH POINTER AT "0" READING).

b. TYPES SH10-160 & ABOVE SHALL BE PRECOMPRESSED TO THE 'COLD POSITION' INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS. 06 & 07 PRIOR TO DESPATCH. 08

3. MARKING :

a. FOR TYPES SH10-160 & ABOVE, HANGER TAG NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.

b. FOR TYPES SH10-160 & ABOVE, COLD AND HOT SETTING POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO. 12) WITH GREEN AND RED PAINTS RESPECTIVELY.

C. TYPE NUMBERS SHALL BE PUNCHED ON ALL HANGERS.

4. POINTERS (ITEM NO. 10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO. 08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM NO. 01). 04

5. SPINDLE BOLT AND NUT (ITEM NOS. 04 & 18) SHALL BE MATCH-DRILLED FOR EACH AND EVERY ASSEMBLY TO THE HOLE SIZE INDICATED BELOW :

TYPE	HOLE SIZE
SH1-160 TO SH7-160	DIA 4.5 MM
SH8-160 & SH9-160	DIA 5.5 MM
SH10-160 TO SH15-160	DIA 7.0 MM

03 6. ~~THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT SOLITARLY THE GALVANISED / CHROMO TIED COMPONENTS WHILE PAINTING.~~

7. THE SLOTS ON TOP ARE TO BE FREE FROM WELD METAL (i e) AFTER WELDING ALL ROUND, THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

FOR SITE :

1. BEFORE HYDRAULIC TEST :

a. TYPES SH1-160 TO SH9-160 : HANGERS SHALL BE ADJUSTED TO THE COLD SET LOAD INDICATED IN THE CONTRACT DOCUMENTS FOR THE RESPECTIVE HANGER TAG NOS. PRIOR TO ERECTION. AT THIS SET LOAD, HANGERS SHALL BE LOCKED USING ITEM NOS. 06 & 07.

b. TYPES SH10-160 & ABOVE : HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

2. AFTER HYDRAULIC TEST :

a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING ITEM NOS. 06 & 07 UNTIL THEY ARE SEATED ON TURN BUCKLE (ITEM NO. 15).

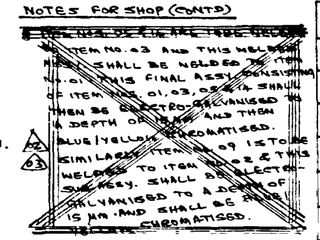
3. MARKING FOR SH1-160 TO SH9-160 :

a. HANGER TAG NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON DETAILS INDICATED IN THE CONTRACT DOCUMENTS.

b. COLD AND HOT SETTING POSITIONS SHALL BE MARKED IN THE TRAVEL SCALE WITH GREEN AND RED PAINTS RESPECTIVELY.

NOTES FOR SHOP (CONTD) :

~~7. ALL WELDS OF THE ARC TYPE SHALL BE CONTINUOUS FILLET WELDS.~~



~~8. THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT SOLITARLY THE GALVANISED / CHROMO TIED COMPONENTS WHILE PAINTING.~~ 03 04

8. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN. 04

ITEM NO.	DESCRIPTION	DRAWING NO.	QTY	
19	HAMMER DRIVEN SCREW	STANDARD	8	
18	MIDDLE PLATE ASSY	2-80-999-99129	1	
17	SPLIT PIN	STANDARD	1	
16	NUT	3-80-999-99152	1	
15	TURN BUCKLE	2-80-999-99140	1	
14	INNER PIPE GUIDE	3-80-999-99154	1	
13	NAME PLATE	3-80-999-99118	1	
12	TRAVEL SCALE	3-80-999-99119	2	
11	SPRING	2-80-999-99117	2	
10	POINTER	4-80-999-99047	2	
09	LUG PLATE	2-80-999-99138	1	
08	SPRING PLATE	2-80-999-99133	1	
07	HYD. LOCK NUT	3-80-999-99153	1	
06	CENTERING NUT	2-80-999-99131	1	
05	BOTTOM SOCKET	2-80-999-99136	1	
04	SPINDLE BOLT	2-80-999-99141	1	
03	BOTTOM PLATE	2-80-999-99135	1	
02	TOP PLATE	2-80-999-99130	1	
01	HOUSING	3-80-999-99149	1	

REV	DATE	ALTD / APPD	DESCRIPTION
08	11/7/1988	ALTD: APPD: APMC-DA	* GENERAL NOTE 3 ALTERED * SHOP NOTES 1, 2a, 2b ALTERED * TITLE CHANGED FROM VARIABLE SPRING HANGERS TO VARIABLE LOAD HANGERS
07	24/2/1988	ALTD: APPD: VL	SHOP NOTE 4 ALTERED FOR POINTERS.
06	22/12/1988	ALTD: APPD:	SHOP NOTE 8 ALTERED FOR PAINTING.
05	10/2/88	ZONE H3, G3	DIMENSION 'G' ALTD FOR VAR. NO. 01 TO 13 IN TABLE.
04	24/9/96	ALT:- CHD:-	L' Dimensions Changed in Var. No:- 05
03	19/2/94	ALTERED: APPROVED:	IN GENERAL NOTE NO. 1 DRG. NO. ALTERED. GENERAL NOTE NO. 2 DELETED. NOTE NO. 6 (FOR SHOPS) DELETED. NOTE NO. 8 (FOR SHOPS) CHANGED. WELD LENGTH ALTERED FOR WELDING ITEM NO. 03 & 14 AND ITEM NO. 03 & 01 INCLUDED IN THE TABLE.
02			SHOP NUTS NO. 8 ADDED.
01	27/6/89	ALTERED CHECKED: SL	ZONE: FOR VAR. NOS. 09 - DIMENSIONS B, L, E & F AND WEIGHT ALTERED. NOTES (FOR SHOPS) REVISED. REV: T.T.S. ALTERED. NO. T.T.S. CLEARED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF ITEM
DRN.	PSakthivel		07.07.88	
CHD	M.MMANI			
APPD	J. JUDE		120988	

DEPT: C/M/F | GRADE OF UNTOL. DIM: | SCALE: NTS | WEIGHT (Kg): | REF TO ASSY/ OLD DRG: | ITEM No.

TITLE: VARIABLE LOAD HANGERS (Type: SH 160) 08

CARD CODE: U 01

DRAWING No.: 1-80-999-99003

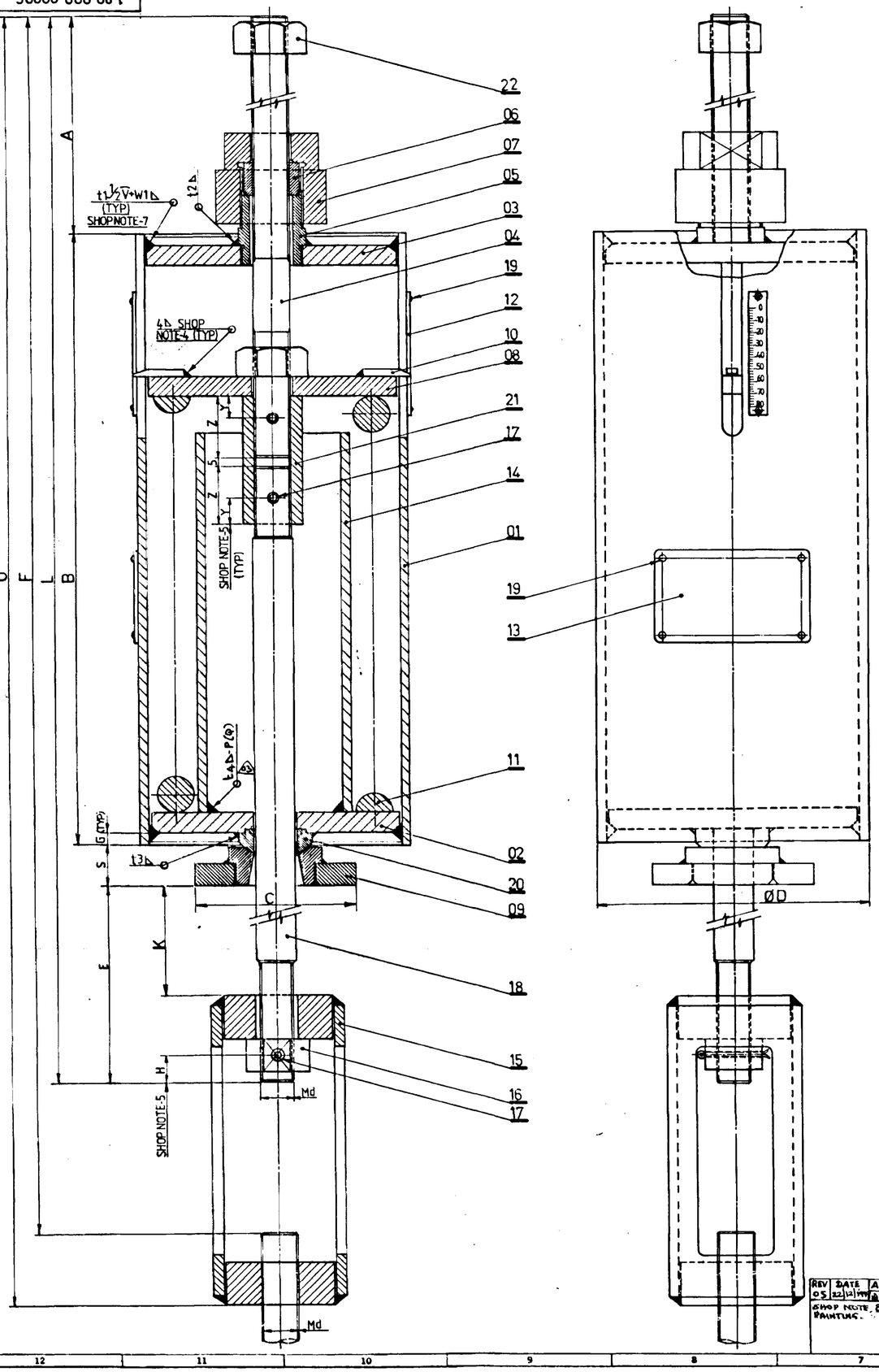
REV.: 08

TRACING REPRINTED WITH REV-07 "TIF" FILE & REV-08 DETAILS INCORPORATED ON 20-09-07

5127 A

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

90066-666-08-1



VAR NO.	TYPE	BIN CODE	ØO	B	O	Md	ASSY. Wt (kg)	A Δ	C	E	F	G	H	L	S	Y	Z	K	t1-1/2√V+W1Δ	t2Δ	t3Δ	t4Δ-P(Φ) Δ3	REMARK
01	SA 1- 80	94-821-461-00	113.9	204	638	M12x1.75	5.515	148	70	133	567	5	11	517	24	5	10	100	4-1/2√V+4Δ	4Δ	4Δ	3Δ-20(25)	
02	SA 2- 80	94-821-462-00	166.5	201	633	M12x1.75	8.631	147	70	133	562	8	11	512	23	5	10	100	4-1/2√V+5Δ	4Δ	4Δ	3Δ-20(40)	
03	SA 3- 80	94-821-463-00	113.9	271	755	M12x1.75	7.406	148	80	183	684	5	11	634	24	5	10	150	4-1/2√V+4Δ	4Δ	4Δ	3Δ-15(20)	
04	SA 4- 80	94-821-464-00	113.9	288	772	M12x1.75	8.641	148	80	183	701	5	11	851	24	5	10	150	4-1/2√V+4Δ	4Δ	4Δ	3Δ-20(25)	
05	SA 5- 80	94-821-465-00	166.5	298	862 Δ1	M18x2.00	15.532	165	80	248	815	8	13	740	23	7	14	200	4-1/2√V+5Δ	5Δ	4Δ	3Δ-20(35)	
06	SA 6- 80	94-821-466-00	166.5	298	851 Δ1	M18x2.00	16.764	164	80	246	814	8	13	739	23	7	14	200	5-1/2√V+5Δ	8Δ	5Δ	3Δ-20(35)	
07	SA 7- 80	94-821-467-00	219.1	305	949	M20x2.50	28.814	182	90	250	844	7	15	789	24	9	18	200	8-1/2√V+6Δ	8Δ	5Δ	3Δ-30(50)	
08	SA 8- 80	94-821-468-00	166.5	397	1111 Δ1	M24x3.00	31.512	197	110	304	1007	6	17	932	25	10	20	250	5-1/2√V+5Δ	8Δ	5Δ	3Δ-25(35)	
09	SA 9- 80	94-821-469-00	219.1	460 Δ1	1170 Δ1	M24x3.00	54.087 Δ1	194	110	304	1066 Δ1	7	17	991 Δ1	24	10	20	250	8-1/2√V+6Δ	8Δ	6Δ	3Δ-30(40)	
10	SA10- 80	94-821-470-00	219.1	493	1317	M30x3.50	74.479	219	130	371	1201	7	20	1128	35	13	28	300	8-1/2√V+8Δ	7Δ	6Δ	3Δ-30(50)	
11	SA11- 80	94-821-471-00	323.9	473	1327	M36x4.00	122.835	245	150	377	1211	9	23	1138	33	16	32	300	8-1/2√V+8Δ	8Δ	8Δ	3Δ-40(80)	
12	SA12- 80	94-821-472-00	355.6	530	1486	M48x5.00	216.804	288	200	409	1350	9	29	1275	39	21	42	300	8-1/2√V+8Δ	10Δ	8Δ	3Δ-40(80)	
13	SA13- 80	94-821-473-00	406.4	639	1685	M56x4.00	326.263	328	200	487	1549	11	33	1474	40	25	50	350	10-1/2√V+10Δ	15Δ	8Δ	3Δ-50(80)	

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG.NO. 4-80-999-99068.
2. ~~ALL OF MATERIALS: BBR TYPES SA1-80 TO SA13-80 REFER RUBBER BOM. BR05.4-80-999-99092 TO 4-80-999-99105 RESPECTIVELY.~~
3. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 56 MM. FOR ALL TYPES. DIMENSIONS E,F,L,O,K MAY CHANGE IN LINE WITH THE TOLERANCES/CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY.

FOR SHOPS :

1. TRAVEL SCALE (ITEM.12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM.10) READS 40mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 40mm TRAVEL - GIVEN IN THE DRG. 4-80-999-99068).

2. LOCKING :
   a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE COLD POSITION INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS.06 & 07 PRIOR TO DESPATCH.

3. MARKING :
   a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG NO., TYPE NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO.13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.
   b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO.12) WITH GREEN AND RED PAINTS RESPECTIVELY.

4. POINTERS (ITEM NO.10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO.08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM NO.01).

5. TOP AND BOTTOM TIE RODS (ITEM NO. 04 & 18) ARE TO BE MATCH DRILLED WITH COUPLING (ITEM NO.21). ALSO BOTTOM TIE ROD (ITEM NO.18) IS TO BE MATCH DRILLED WITH NUT (ITEM NO. 16). HOLE SIZES FOR THESE MATCH DRILLING ARE GIVEN BELOW.

TYPE	HOLE SIZE
SA1-80 TO SA7-80	DIA 4.5 MM
SA8-80 & SA9-80	DIA 5.5 MM
SA10-80 TO SA13-80	DIA 7.0 MM

Δ3 ~~ZINC RICH PRIMER SHALL BE APPLIED LOCALLY AFTER WELDING, WHEREVER REQUIRED.~~

7. THE SLOTS ON TOP ARE TO BE FREE FROM WELDMETAL (i.e.) AFTER WELDING ALL ROUND, THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

FOR SITE :

1. DURING ERECTION:
   a. THE SPRING HANGERS SHALL BE ERECTED SUCH THAT THE BEARING PLATE ASSY (ITEM NO.09) RESTS PERFECTLY ON TOP OF SUPPORTING STRUCTURE. AT THIS CONDITION THE BEARING PLATE ASSY IS TO BE WELDED TO THE SUPPORTING STRUSTURE.

2. BEFORE HYDRAULIC TEST :
   a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST :
   a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING ITEM NOS.06 & 07 AS PER THE FOLLOWING STEPS..
      i) REMOVE NUT (ITEM NO.22 - AT THE TOP) FROM THE TOP TIE ROD (ITEM NO.04).
      ii) LOOSEN HYD.LOCK NUT (ITEM NO.07) AND THEN CENTERING NUT (ITEM NO.06).
      iii) REMOVE HYD.LOCK NUT AND CENTERING NUT (ITEM NO.07 & 06) FROM THE TOP TIE ROD (ITEM NO.04).
      iv) THEN ASSEMBLE CENTERING NUT, HYD.LOCK NUT AND NUT (ITEM NO 06,07 & 22) IN THE SAME SEQUENCE, SUCH THAT THE HYD.LOCK NUT IS HELD BETWEEN CENTERING NUT AND TOP NUT AND THE DISTANCE BETWEEN THE FREE END OF TOP TIE ROD AND TOP OF NUT SHALL BE APPROX.5 MM.

NOTES FOR SHOPS (CONTD)

~~ITEM NO. 02 & 06 ARE TO BE WELDED TO ITEM NO. 09 AND THE WELDED ASSY. SHALL BE WELDED TO ITEM NO. 01. THE FINAL WELDING ASSY. CONSISTING OF ITEM NOS. 01, 02, 06 & 20 SHALL THEN BE ELECTRO-GALVANISED TO A DEPTH OF 15 µm AND SHALL BE BLUE/YELLOW CHROMATISED. SIMILARLY ITEM NO. 05 IS TO BE WELDED TO ITEM NO. 03 AND THE WELDMENT SHALL BE ELECTO-GALVANISED TO A DEPTH OF 15 µm AND CHROMATISED.~~ Δ2 Δ3

8. THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT Δ3 Δ2 SUITABLY THE GALVANISED/CHROMATISED COMPONENTS WHILE PAINTING.

8. PAINTING SCHEME SHALL BE AS Δ3 PER APPLICABLE QUALITY PLAN.

ITEM NO.	DESCRIPTION	DRAWING NO.	QTY	
22	NUT	STANDARD	2	
21	COUPLING	3-80-999-99188	1	
20	SPHERICAL WASHER	3-80-999-99187	1	
19	HAMMER DRIVEN SCREW	STANDARD	8	
18	BOTTOM TIE ROD	3-80-999-99186	1	
17	SPLIT PIN	STANDARD	3	
16	NUT	3-80-999-99152	1	
15	TURN BUCKLE	2-80-999-99140	1	
14	INNER PIPE GUIDE	3-80-999-99154	1	
13	NAME PLATE	3-80-999-99118	1	
12	TRAVEL SCALE	3-80-999-99117	2	
11	SPRING	2-80-999-99117	1	
10	POINTER	4-80-999-99047	2	
09	BEARING PLATE ASSY	3-80-999-99183	1	
08	SPRING PLATE	3-80-999-99182	1	
07	HYD. LOCK NUT	3-80-999-99153	1	
06	CENTERING NUT	2-80-999-99131	1	
05	BOTTOM SOCKET	2-80-999-99136	1	
04	TOP TIE ROD	3-80-999-99181	1	
03	TOP PLATE	3-80-999-99180	1	
02	BOTTOM PLATE	3-80-999-99179	1	
01	HOUSING	3-80-999-99175	1	

REV	DATE	ALTD:	APPD:	CHANGE
07	11/4/2007		APPROVED:	GENERAL NOTE-3 ALTERED. SHOP NOTES 1, 2a ALTERED. TITLE ALTD FROM 'VARIABLE SPRING HANGERS' TO 'VARIABLE LOAD HANGERS'.
06	30/1/2006		APPD	SHOP NOTE 4 ALTERED FOR POINTERS.
05	22/12/1999		APPD:	SHOP NOTE 8 ALTERED FOR PAINTING.
04	23/9/1996	CHD :-		'A' Dimensions changed in all VARS. 'D' Dimensions changed in VAR Nos.-05, 06, 08 & 09
03	19/2/1994	ALTERED: APPROVED:		GENERAL NOTE NO.2 DELETED. NOTE NO.6 (FOR SHOPS) DELETED & NOTE NO.8 (FOR SHOPS) CHANGED. WELD LENGTH ALTERED FOR WELDING ITEM NO. 02 & 16 AND INCLUDED IN THE TABLE.
02	1-8-90			FOR VAR NO 09 - DIMENSIONS - B, O, F & L AND WEIGHT ALTERED. NOTE-6 (FOR SHOPS) REVISED. SHOP NOTE-8 NO. 8 ADDED.
01	27/6/89	ALTERED BY: CHECKED :-		ZONE

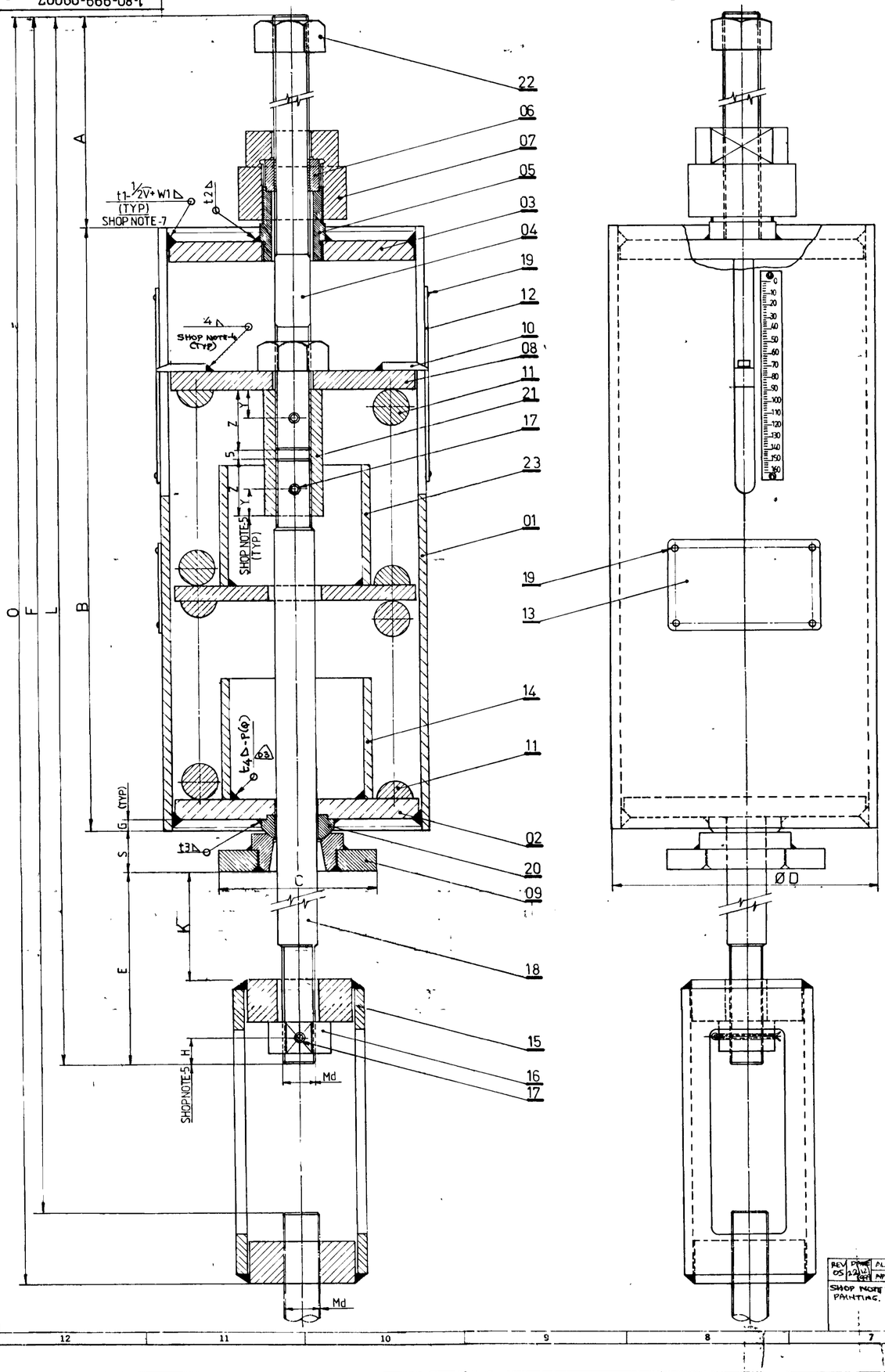
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STANDARD		
BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS	DRN. P.S.VEL.	SIGN	DATE 08-08-88
	CHD. M.M.MANI		
	APPD. J.JUDE.		30.08.88
DEPT.	SCALE NTS	WEIGHT (Kg)	REF.TO ASSY/ OLD DRG.
CODE C/M/F	GRADE OF UN TOL. DIM.		ITEM No.
TITLE VARIABLE LOAD HANGERS (Type: SA 80)	CARD CODE U 01	DRAWING No. 1-80-999-99006	REV 07

TRACING REPRINTED WITH REV-06 'TIF' FILE & REV-07 DETAILS INCORPORATED ON 20-09-07

SIZE-A1

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

L0066-666-08-1



VAR NO.	TYPE	BIN CODE	ØD	B	O	Md	ASSY.Wt (kg)	A	C	E	F	G	H	L	S	Y	Z	K		t1-1/2V+W1 Δ	t2 Δ	t3 Δ	t4 Δ-P(@) 03	REMARKS
01	SA 1-160	94-821-476-00	113.9	378	908	M12x1.75	8594	252	70	133	897	5	11	787	24	5	10	100		4-1/2V+4 Δ	4 Δ	4 Δ	3D-20(25)	
02	SA 2-160	94-821-477-00	168.5	370	898	M12x1.75	14.159	251	70	133	827	6	11	777	23	5	10	100		4-1/2V+5 Δ	4 Δ	4 Δ	3D-20(40)	
03	SA 3-160	94-821-478-00	113.9	512	1092	M12x1.75	12.270	252	80	183	1021	5	11	971	24	5	10	150		4-1/2V+4 Δ	4 Δ	4 Δ	3D-15(20)	
04	SA 4-160	94-821-479-00	113.9	548	1126	M12x1.75	14.718	252	80	183	1055	5	11	1005	24	5	10	150		4-1/2V+4 Δ	4 Δ	4 Δ	3D-20(25)	
05	SA 5-160	94-821-480-00	168.5	561	1211 2	M16x2.00	25.862	269	80	246	1174	6	13	1099	23	7	14	200		4-1/2V+5 Δ	5 Δ	4 Δ	3D-20(35)	
06	SA 6-160	94-821-481-00	168.5	557	1206 2	M16x2.00	27.656	268	80	246	1169	6	13	1094	23	7	14	200		5-1/2V+5 Δ	6 Δ	5 Δ	3D-20(35)	
07	SA 7-160	94-821-482-00	219.1	564	1304	M20x2.50	47.756	286	90	250	1199	7	15	1124	24	9	18	200		6-1/2V+6 Δ	8 Δ	5 Δ	3D-30(50)	
08	SA 8-160	94-821-483-00	168.5	743	1554	M24x3.00	53.381	301	110	304	1449	6	17	1374	25	10	20	250		5-1/2V+5 Δ	8 Δ	5 Δ	3D-25(35)	
09	SA 9-160	94-821-484-00	219.1	863 1	1670 1	M24x3.00	94.440 1	298	110	304	1565 1	7	17	1430 1	24	10	20	250		6-1/2V+6 Δ	8 Δ	6 Δ	3D-30(40)	
10	SA10-160	94-821-485-00	219.1	916	1836	M30x3.50	124.459	323	130	371	1720	7	20	1645	35	13	26	300		6-1/2V+6 Δ	7 Δ	6 Δ	3D-30(50)	
11	SA11-160	94-821-486-00	323.9	867	1817	M36x4.00	218.165	349	150	377	1701	9	23	1626	33	16	32	300		8-1/2V+8 Δ	8 Δ	8 Δ	3D-40(80)	
12	SA12-160	94-821-487-00	355.6	964	2016	M48x5.00	360.558	392	200	409	1880	9	29	1805	39	21	42	300		8-1/2V+8 Δ	10 Δ	8 Δ	3D-40(80)	
13	SA13-160	94-821-488-00	406.4	1166	2308	M56x4.00	549.462	424	200	487	2172	11	33	2097	40	25	50	350		10-1/2V+10 Δ	15 Δ	8 Δ	3D-50(80)	

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG.NO. 4-80-999-99068.
~~SUBT: OF MATERIAL S: FOR TYPES SA1-160 TO SA15-160 REFER DRAWG NOS. DRGS.4-80-999-99107 TO 4-80-999-99121 RESPECTIVELY..~~ 03
2. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 112 MM, FOR ALL TYPES. DIMENSIONS E, F, L, O, K MAY CHANGE IN LINE WITH THE TOLERANCES) CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY. 01

FOR SHOPS :

1. TRAVEL SCALE (ITEM-12) SHALL BE FIXED AT A POSITION, SUCH THAT THE POINTER (ITEM-10) READS 80 mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 80 mm TRAVEL - GIVEN IN THE DRG 4-80-999-99068). 02

2. LOCKING :
   a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE 'COLD POSITION' INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS. AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS.06 & 07 PRIOR TO DESPATCH.. 02

3. MARKING :
   a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG NO., TYPE NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO.13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS..
   b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO.12) WITH GREEN AND RED PAINTS RESPECTIVELY..

4. POINTERS (ITEM NO.10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO.08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM NO.01).. 05

5. TOP AND BOTTOM TIE RODS (ITEM NO. 04 & 18) ARE TO BE MATCH DRILLED WITH COUPLING (ITEM NO.21). ALSO BOTTOM TIE ROD (ITEM NO.18) IS TO BE MATCH DRILLED WITH NUT (ITEM NO. 16). HOLE SIZES FOR THESE MATCH DRILLING ARE GIVEN BELOW.

TYPE	HOLE SIZE
SA1-160 TO SA7-160	DIA 4.5 MM
SA8-160 & SA9-160	DIA 5.5 MM
SA10-160 TO SA15-160	DIA 7.0 MM

~~6. ALL MACHINED SURFACES SHALL BE APPLIED WITH A COAT OF RUST PREVENTIVE COMPOUND AFTER MACHINING, WHEREVER REQUIRED.~~ 01

7. THE SLOTS ON TOP ARE TO BE FREE FROM WELDMETAL (i.e.) AFTER WELDING ALL ROUND, THE SLOTS SHALL BE DRESSED TO HAVE A SMOOTH SURFACE IN LINE WITH THE TOP SURFACE OF THE TOP PLATE.

FOR SITE.

1. DURING ERECTION :
   a. THE SPRING HANGERS SHALL BE ERECTED SUCH THAT THE BEARING PLATE ASSY. (ITEM NO.09) RESTS PERFECTLY ON TOP OF SUPPORTING STRUCTURE. AT THIS CONDITION THE BEARING PLATE ASSY IS TO BE WELDED TO THE SUPPORTING STRUSTURE..

2. BEFORE HYDRAULIC TEST :
   a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD SET LOAD ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST :
   a. ALL HANGERS SHALL BE UNLOCKED BY LOOSENING ITEM NOS.06 & 07 AS PER THE FOLLOWING STEPS..
      i) REMOVE NUT (ITEM NO.22 - AT THE TOP) FROM THE TOP TIE ROD (ITEM NO.04).
      ii) LOOSEN HYD.LOCK NUT (ITEM NO.07) AND THEN CENTERING NUT (ITEM NO.08).
      iii) REMOVE HYD.LOCK NUT AND CENTERING NUT (ITEM NO.07 & 06) FROM THE TOP TIE ROD (ITEM NO.04)..
      iv) THEN ASSEMBLE CENTERING NUT, HYD.LOCK NUT AND NUT (ITEM NO.06,07 & 22) IN THE SAME SEQUENCE, SUCH THAT THE HYD.LOCK NUT IS HELD BETWEEN CENTERING NUT AND TOP NUT AND THE DISTANCE BETWEEN THE FREE END OF TOP TIE ROD AND TOP OF NUT SHALL BE APPROX. 5 MM..

NOTES FOR SHOPS (CONT'D)

~~ITEM NOS 11 & 20 ARE TO BE~~ WELDED TO ITEM NO.02 AND IS WELDED ASSY. SHALL BE WELDED TO ITEM NO. 01. THIS FINAL HOUSING ASSY. CONSISTING OF ITEM NOS 01, 02, 11 & 20 SHALL THEN BE ELECTRO-GALVANISED TO A DEPTH OF 15 µm AND SHALL BE BLUE/ YELLOW CHROMATISED. 02
SIMILARLY ITEM NO. 5 IS TO BE WELDED TO ITEM NO 58 AND THIS SUB-ASSY SHALL BE ELECTRO-GALVANISED TO A DEPTH OF 15 µm AND ~~SHALL BE~~ YELLOW CHROMATISED. 02

~~4. THE ASSEMBLED VARIABLE SPRING~~ HANGER SHALL BE PAINTED WITH EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT 03 SUITABLY THE GALVANISED/CHROMATISED COMPONENTS WHILE PAINTING. 04

5. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN. 05

ITEM NO	DESCRIPTION	DRAWING NO.	QTY
23	MIDDLE PLATE ASSY	2-80-999-99129	1.
22	NUT	STANDARD	2
21	COUPLING	3-80-999-99188	1.
20	SPHERICAL WASHER	3-80-999-99187	1.
19	HAMMER DRIVEN SCREW	STANDARD	8
18	BOTTOM TIE ROD	3-80-999-99190	1.
17	SPLIT PIN	STANDARD	3
16	NUT	3-80-999-99152	1
15	TURN BUCKLE	2-80-999-99140	1
14	INNER PIPE GUIDE	3-80-999-99154	1
13	NAME PLATE	3-80-999-99118	1
12	TRAVEL SCALE	3-80-999-99119	2
11	SPRING	2-80-999-99117	2
10	POINTER	4-80-999-99047	2
09	BEARING PLATE ASSY	3-80-999-99183	1
08	SPRING PLATE	3-80-999-99182	1
07	HYD. LOCK NUT	3-80-999-99153	1
08	CENTERING NUT	2-80-999-99131	1
05	BOTTOM SOCKET	2-80-999-99136	1
04	TOP TIE ROD	3-80-999-99189	1
03	TOP PLATE	3-80-999-99180	1
02	BOTTOM PLATE	3-80-999-99179	1
01	HOUSING	3-80-999-99176	1

REV	DATE	ALTD. / APPD:	DESCRIPTION
07	11/1/96		• GENERAL NOTE-3 ALTD. • SHOP NOTES 1, 2 & 3 ALTD. • TITLE ALTD FROM 'VARIABLE SPRING HANGERS' TO 'VARIABLE LOAD HANGERS'
06	2/2/2000		SHOP NOTE 4 ALTERED FOR POINTERS.
05	22/2/99		SHOP NOTE 8 ALTERED, FOR PAINTING.
04	24/9/96	CHD:-	'O' Dimensions Changed in VAR. No:- 05 & 06
03	19/2/94	APPROVED:	GENERAL NOTE NO.2 DELETED. NOTE NO.6 (FOR SHOPS) DELETED. NOTE NO.8 (FOR SHOPS) CHANGED. WELD LENGTH ALTERED FOR WELDING ITEM NO.02 & 16 AND INCLUDED IN THE TABLE.
02	1.8.90		SHOP NOTE NO 8 ADDED.
01	27/4/89	CHECKED	FOR VAR. NO. 09 - DIMENSIONS B, O, F & L AND WEIGHT ALTERED. NOTE-6 (FOR SHOPS) REVISED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	P.S.VEL		06.09.88
CHD	M.M MANI		14-10-88
APPD	J JUDE		14X88

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY/ OLD DRG	ITEM No
CODE C/M/F		1 2			

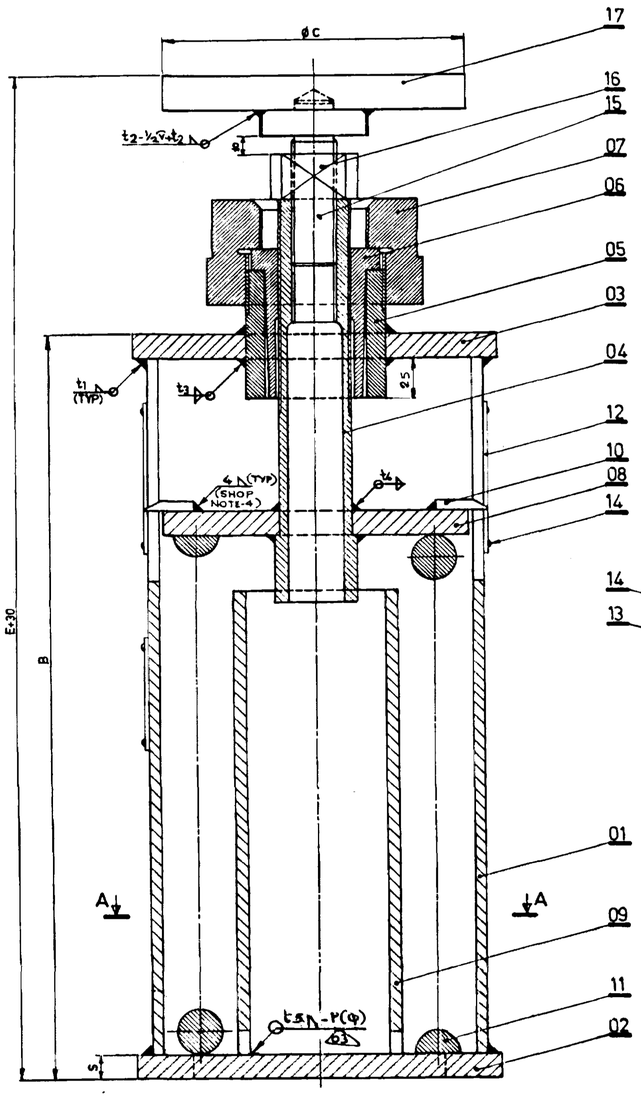
TITLE: VARIABLE LOAD HANGERS (Type: SA-160)

CARD CODE: U 01

DRAWING No: 1-80-999-99007 REV. 07

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 1-80-999-99008



SECTION- A A

VAR NO	TYPE	BIN CODE	D	B	E	ASSY. WT (kg)	M	A	C	S	G		t1Δ	t2	t3Δ	t4Δ	tSΔ-P(φ) 03	REMARKS
01	SS- 1-80	94-821-431-00	113.9	209	411	8.952	115	160	110	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(25)	
02	SS- 2-80	94-821-432-00	186.5	204	406	10.936	180	210	110	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(40)	
03	SS- 3-80	94-821-433-00	113.9	276	480	9.454	115	160	150	5	15		3Δ	1.5	3Δ	3Δ	3Δ-15(20)	
04	SS- 4-80	94-821-434-00	113.9	293	497	10.888	115	160	150	5	15		3Δ	1.5	3Δ	3Δ	3Δ-20(25)	
05	SS- 5-80	94-821-435-00	166.5	298	504	18.817	160	210	150	5	15		3Δ	1.5	3Δ	4Δ	3Δ-20(35)	
06	SS- 6-80	94-821-436-00	186.5	298	501	18.834	160	210	150	8	15		3Δ	1.5	3Δ	4Δ	3Δ-20(35)	
07	SS- 7-80	94-821-437-00	219.1	300	511	33.347	205	260	200	8	19		4Δ	1.5	3Δ	5Δ	3Δ-30(50)	
08	SS- 8-80	94-821-438-00	166.5	391	613	36.078	160	210	200	10	19		4Δ	2	4Δ	6Δ	3Δ-25(35)	
09	SS- 9-80	94-821-439-00	219.1	432	672	53.698	205	260	220	12	23		4Δ	2	4Δ	8Δ	3Δ-30(40)	
10	SS-10-80	94-821-440-00	219.1	480	704	73.853	205	260	220	16	23		4Δ	2	8Δ	8Δ	3Δ-30(50)	
11	SS-11-80	94-821-441-00	323.9	451	688	130.918	295	370	220	16	28		8Δ	3	8Δ	8Δ	3Δ-40(80)	
12	SS-12-80	94-821-442-00	355.6	499	755	207.853	320	400	260	20	28		8Δ	4	8Δ	10Δ	3Δ-40(80)	
13	SS-13-80	94-821-443-00	408.4	597	882	313.318	365	450	290	20	33		8Δ	5	10Δ	10Δ	3Δ-50(80)	

NOTES :

GENERAL :

1. FOR SPRING RATE AND SELECTION CHART REFER DRG. NO. 4-80-999-99068.
~~2. TABLE OF MATERIALS FOR TYPES SS1-80 TO SS15-80 REFER DRWG. DRGS. 4-80-999-99125 TO 4-80-999-99130 RESPECTIVELY.~~
3. DIMENSIONS INDICATED IN THIS DRAWING ARE BASED ON THE INITIAL PRECOMPRESSION OF 56 MM. FOR ALL TYPES. DIMENSION E MAY CHANGE IN LINE WITH THE TOLERANCES / CHARACTERISTICS OF THE SPRING, IN THE ASSEMBLY.

FOR SHOPS :

1. TRAVEL SCALE (ITEM-12) SHALL BE FIXED AT A POSITION SUCH THAT THE POINTER (ITEM-10) READS 40mm IN THE TRAVEL SCALE AT THE MID LOAD (CORRESPONDING TO LOAD AT 40mm TRAVEL - GIVEN IN THE DRG 4-80-999-99068).

2. LOCKING :
   a. ALL TYPES OF SPRING HANGERS SHALL BE PRECOMPRESSED TO THE 'COLD POSITION' INDICATED IN THE CONTRACT DOCUMENTS FOR INDIVIDUAL HANGERS, AT THIS PRECOMPRESSION, HANGERS SHALL BE LOCKED USING ITEM NOS. 06 & 07 PRIOR TO DESPATCH.

3. MARKING :
   a. FOR ALL TYPES OF SPRING HANGERS, HANGER TAG NO., TYPE NO., OPERATING LOAD AND MOVEMENT SHALL BE PUNCHED IN THE NAME PLATE (ITEM NO. 13), BASED ON THE DETAILS INDICATED IN THE CONTRACT DOCUMENTS.
   b. FOR ALL TYPES OF SPRING HANGERS, COLD AND HOT MOVEMENT POSITIONS SHALL BE MARKED ON THE TRAVEL SCALE (ITEM NO. 12) WITH GREEN AND RED PAINTS RESPECTIVELY.

4. POINTERS (ITEM NO. 10) ARE TO BE WELDED TO SPRING PLATE (ITEM NO. 08) SUCH THAT THEY PROTRUDE BY 2 TO 4 MM OUTSIDE THE HOUSING (ITEM NO. 01).

~~5. ZINC RICH PAINTS SHALL BE APPLIED LOCALLY AFTER WELDING, WHEREVER REQUIRED.~~
~~6. ITEM NOS. APPEARING IN BRACKETS REFER TO ITEM NOS. OF SIMILAR PARTS IN FIGURE RELATED TO ITEM NO. 05. THESE SUBASSEMBLIES ARE USED IN SPRING HANGERS SELECTED FOR A SHIFT OF 75 MM & ABOVE.~~

FOR SITE

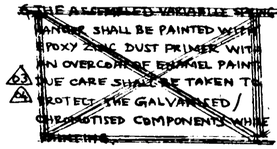
1. DURING ERECTION :
   WHILE LOCATING THE SPRING HANGER IN POSITION THE FOLLOWING STEPS SHALL BE FOLLOWED.
   a. REDUCE THE OVERALL HEIGHT (E) OF THE SPRING HANGER BY 5 TO 10 MM. BY ROTATING THE DISC (ITEM NO. 17).
   b. INSERT THE SPRING HANGER IN POSITION.
   c. ROTATE THE DISC (ITEM NO. 17) UNTIL IT IS IN FULL CONTACT WITH THE PEDESTAL WELDED TO THE PIPE.
   d. BRING DOWN THE LOCK NUT (ITEM NO. 16) SUCH THAT IT IS IN CONTACT WITH THE SPINDLE PIPE (ITEM NO. 04).

2. BEFORE HYDRAULIC TEST :
   a. ALL TYPES OF SPRING HANGERS SHALL BE CHECKED FOR LOCKED CONDITION AT THE COLD POSITION ALREADY DONE AT SHOPS.

3. AFTER HYDRAULIC TEST :
   a. RELEASE THE HYD. LOCK NUT (ITEM NO. 07) AND SCREW IT ON THE THREADED PORTION OF ADJUSTMENT BOLT (ITEM NO. 15), BELOW THE DISC.
   b. RELEASE THE CENTERING NUT (ITEM NO. 06) TO THE TOPMOST POSSIBLE POINT.

NOTES FOR SHOPS (CONTD.)

~~4. THE ASSEMBLED VARIABLE SPRING HANGER SHALL BE PAINTED WITH~~ EPOXY ZINC DUST PRIMER WITH AN OVERCOAT OF ENAMEL PAINT. DUE CARE SHALL BE TAKEN TO PROTECT THE GALVANISED / CHROMATISED COMPONENTS WHILE PAINTING.



6. PAINTING SCHEME SHALL BE AS PER APPLICABLE QUALITY PLAN.

ITEM NO.	DESCRIPTION	DRAWING NO.	QTY	
17	DISC	3-80-999-99174	1	
16	LOCK NUT	3-80-999-99200	1	
15	ADJUSTMENT BOLT	3-80-999-99197	1	
14	HANGER DRIVEN SCREW	STANDARD	8	
13	NAME PLATE	3-80-999-99118	1	
12	TRAVEL SCALE	3-80-999-99117	2	
11	SPRING	2-80-999-99117	1	
10	POINTER	4-80-999-99047	2	
09	INNER PIPE GUIDE	3-80-999-99154	1	
08	SPRING PLATE	3-80-999-99198	1	
07	HYD. LOCK NUT	3-80-999-99192	1	
06	CENTERING NUT	3-80-999-99193	1	
05	BOTTOM SOCKET	3-80-999-99194	1	
04	SPINDLE PIPE	3-80-999-99196	1	
03	TOP PLATE	3-80-999-99198	1	
02	BOTTOM PLATE	3-80-999-99198	1	
01	HOUSING	3-80-999-99177	1	

REV	DATE	ALTD/APPD	DESCRIPTION
06	11/9/2000	ALTD: APPD: AP ME-SA	• GENERAL NOTE 3 ALTD. • SHOP NOTES 1, 2 a. ALTD. • TITLE ALTD FROM 'VARIABLE SPRING HANGERS' TO 'VARIABLE LOAD HANGERS'
05	24/12/97	APPD	SHOP NOTE 4 ALTERED FOR POINTERS.
04	22/1/97	APPD	SHOP NOTE 6 ALTERED FOR PAINTING
03	19/2/96	ALTERED: APPROVED:	GENERAL NOTE NO. 2 DELETED. NOTE NO. 5 (FOR SHOP) DELETED. NOTE NO. 6 (FOR SHOP) CHANGED. WELD LENGTH ALTERED FOR WELDING ITEM NO. 02 & 03 AND INCLUDED IN THE TABLE.
02	1.8.90	ALTERED CHECKED — SD —	SHOP NOTE 6 ADDED.
01	27/6/89	ALTERED CHECKED — SD —	FOR VAR. NO. 05 DIMENSIONS B, E AND WEIGHT ALTERED. FOR VAR. NO. 05 DIMENSION S D, A4 M - ALTERED. NOTE - 5 (FOR SHOP) REVISED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF ITEM
DRN.	P.SAKTHIVEL		16.08.88	
CHD.	M.M.MANI		22.08.88	
APPD.	J.JUDE.		30.08.88	

DEPT.	GRADE OF UN TOL. DIM		SCALE	WEIGHT (Kg)	REF TO ASSY/ OLD DRG.	ITEM No.
CODE	C/M/F		NTS			

TITLE: VARIABLE LOAD HANGERS (Type, SS 80)

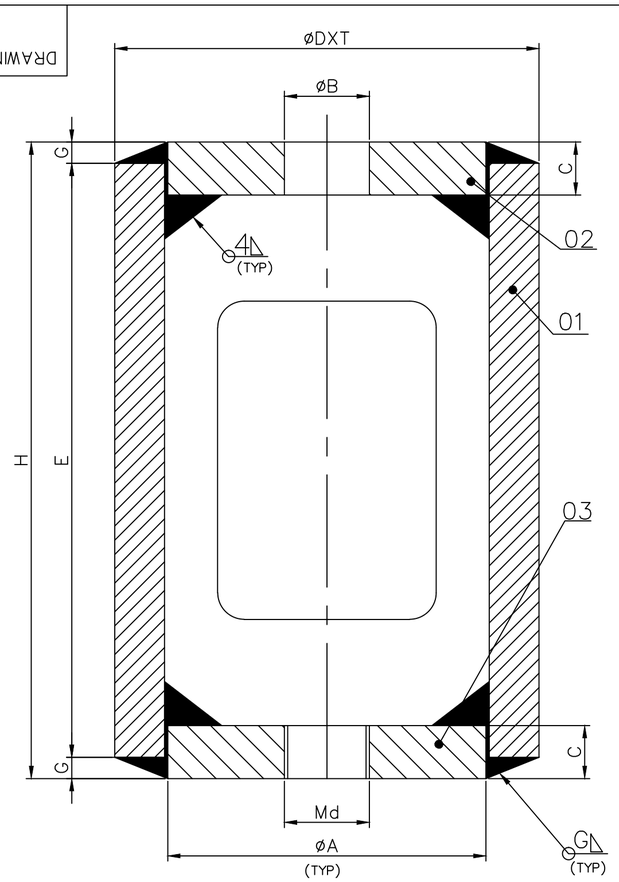
CARD CODE: U 01

DRAWING No.: 1-80-999-99008 REV. 06

TRACING REPRINTED WITH REV-05 'TIF' FILE
REV-06 DETAILS INCORPORATED ON 20-09-07

SIZE A1

DRAWING NO: 2-12-000-01853



NOTES:

01. EACH VARIANT OF THIS ASSEMBLY SHALL CONTAIN CORRESPONDING VARIANT OF THE PARTS.
02. ELECTRODE TO BE USED– E7018.
03. ELECTRO GALVANISING TO A DEPTH OF 15 μM TO BE DONE AFTER WELDING OF ITEM No 02&03 TO ITEM No.01. THREADED PART IS TO BE YELLOW CHROMOTISED TO 15 μM & THREAD MATCHING SHALL BE DONE AFTERWARDS.
04. 'INSIDE WELDING' SHALL BE DONE CAREFULLY TO AVOID WELD SPATTER ETC, MAINLY ON THE INNER SURFACE OF ITEM No.02, ON WHICH THE NUT HAS TO BE ACCOMODATED, ALSO THE HOLE IN ITEM No.02 AND THE INTERNAL THREAD IN ITEM No.03 SHOULD NOT BE DISTURBED DURING 'INSIDE WELDING'.

VAR NO.	øA	B	C	MdxP	øDxT	E	G	H	WEIGHT (kg)
01 to 04	33	14	16	M14x2	ø44.5x5	144	5	154	0.745
05 & 06	50	18	25	M27x3	ø63.5x5.6	146	6	158	1.708
07	50	22	25	M27x3	ø63.5x5.6	218	6	230	2.009
08 & 09	60	27	25	M27x3	ø76.1x7.1	222	6	234	1.995
10	76	33	36	M27x3	ø88.9x5.49	246	8	262	6.494
11	91	40	36	M27x3	ø108x8	252	8	268	6.433
12	109	52	56	M36x3	ø127x8	296	12	320	13.160
13	109	60	56	M48x3	ø127x8	304	12	328	13.033

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT	UNIT WEIGHT / QUANTITY	GS
	03	PLATE–2		3–12–000–06295					1	
	02	PLATE–1		3–80–999–99150					1	
	01	TURN BUCKLE BODY		2–80–999–99139					1	
13 01		TURN BUCKLE		2–12–000–01853		WELDMENT			1	

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355–055

	NAME	SIGNATURE	DATE
DRN	R.GOBI		16.12.2014
CHD	THINESH KUMAR		16.12.2014
APPD	R.T		17.12.2014

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		2–80–999–99140

TITLE: TURN BUCKLE

DRAWING NO : 2–12–000–01853 REV 00

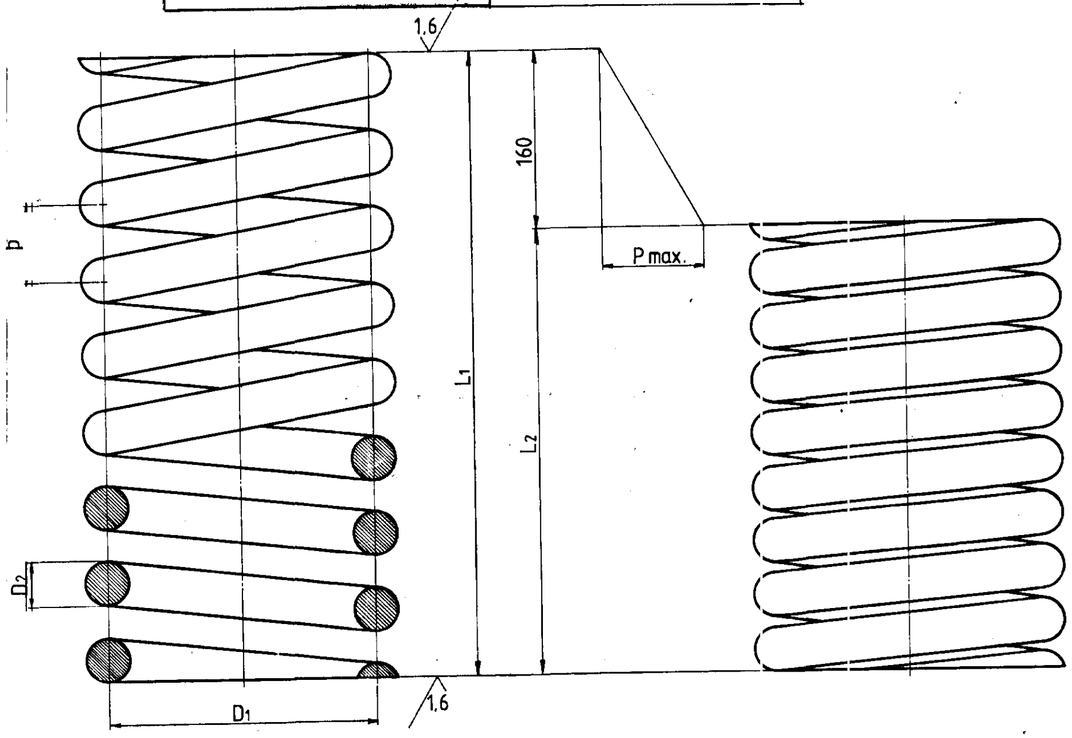
05-228/C

2-80-999-99117

REV	DATE	ALTERED	CHECKED
06	4.8.93	OA	

IN NOTE 4. 'PHOSPHATING' REMOVED

NOTE NO 13 ADDED



VAR. NO.	TYPE NO.	LOAD P max. (Kg)	D_1	D_2	p	L_1	L_{BL}	NO. OF EFFECTIVE COILS	TOTAL NO. OF COILS	DEVELOPED LENGTH OF ROD	WEIGHT (Kg)	RAW MATERIAL LENGTH(NOTE 12)	BIN CODE
01	63 / 160	63	78.0	6	31.54	217	50	6.5	8.5	2100	0.470	2400	
02	100 / 160	100	112.5	8	49.00	212	46	4.0	6.0	2141	0.840	2400	
03	160 / 160	160	70.0	8	23.30	284	108	11.5	13.5	2985	1.180	3300	
04	250 / 160	250	82.0	10	26.67	300	124	10.5	12.5	3237	2.000	3500	
05	400 / 160	400	100.5	12.5	31.11	305	129	9.0	10.5	3332	3.210	3600	
06	630 / 160	630	106.0	14	36.13	299	123	7.5	9.0	3015	3.640	3350	
07	1000 / 160	1000	140.0	18	47.45	297	121	5.5	7.0	3097	6.190	3400	
08	1600 / 160	1600	118.0	20	38.00	382	206	9.0	10.5	3913	9.650	4250	
09	2500 / 160	2500	142.0	25	44.63	435	231	8.0	9.5	4259	16.410	4800	
10	4000 / 160	4000	157.0	30	49.38	455	279	8.0	9.5	4709	26.130	5100	
11	6300 / 160	6300	232.0	40	69.20	426	250	5.0	6.5	4759	46.950	5200	
12	10000 / 160	10000	269.0	50	80.44	462	286	4.5	6.0	5094	78.510	5500	
13	16000 / 160	16000	284.0	60	86.00	550	374	5.0	6.5	5826	129.320	6300	
14	25000 / 160	25000	211.0	63	75.9	885	709	10.0	11.5	7673	187.760	8150	
15	40000 / 160	40000	252.0	80	92.00	1034	858	9.5	11.0	8767	345.940		

NOTES

04 01. MATERIAL:- (a) FOR ROD DIA BELOW 40 mm.

(i) SPRING ROD MATL.: BS:970 EN 47 i.e. Gr 735 A50 OF BS:970 PART-5:1972 OR SAE 6150 OR IS:1570 Gr 50 Cr1V23 OR DIN: 50 CrV4.

(ii) MATL.: BS:970 EN 48A OR SAE 9254 OR DIN: 67 Si Cr5 OR IS:3195/75 Gr50 Cr4 V2 IS ACCEPTABLE AS SUBSTITUTE FOR SPIRING ROD DIA UP TO & INCLUDING 25 MM.

(b) FOR ROD DIA 40 mm AND ABOVE: DIN 51 Cr Mo V4

02. MANUFACTURE & WORKMANSHIP:- SHALL BE IN ACCORDANCE WITH ~~TDC:PC:IND:006~~ TECHNICAL DELIVERY CONDITION-TDG:14. (06)

03. TOLERANCE ON LOADING AND OTHER DIMENSIONS SHALL BE IN ACCORDANCE WITH (06) ~~TDC:PC:IND:006:~~ TECHNICAL DELIVERY CONDITION-TDG:14.

04. TOLERANCES ON OTHER DIMENSIONS NOT MENTIONED IN ~~TDC:PC:IND:006~~ (06) TDG:14. ARE LEFT TO THE CHOICE OF THE MANUFACTURER AND SHALL BE SO DETERMINED THAT THE TOLERANCE ON LOADING ARE ADHERED TO. (07)

05 THE SURFACE OF THE SPRINGS SHALL BE SHOT BLASTED AND THEN ~~PHOSPHETED~~ (06) ~~ON TO THE PHOSPHATED SURFACE~~ A COATING OF ZINC DUST PRIMER SHALL BE APPLIED.

06. THE TERMINAL COILS SHALL BE CLOSED, GROUND & SQUARED TO THE PLANE PERPENDICULAR TO THE AXIS OF THE SPRING.

07. HEAT TREATMENT, METALLURGICAL REQUIREMENTS, END CONSTRUCTIONS, LOAD COMPRESSION CHARACTERISTICS, SCRAGGING TEST, CRAMP TEST, LOAD TEST, SURFACE TREATMENT, PROTECTIVE COATING ETC., SHALL BE IN ACCORDANCE WITH ~~TDC:PC:IND:006~~ (06) TECHNICAL DELIVERY CONDITION-TDG:14.

08. TYPE NO. & BIN CODE SHALL BE PAINTED ON EACH SPRING.

09. DIRECTION OF SPRING COILING: RIGHT.

10. L_2 = MINIMUM PERMISSIBLE TEST LENGTH OF SPRING = (L_1 - 160) mm.

11. L_{BL} = SOLID LENGTH OF SPRING (CONDITION OF ADJACENT COILS IN CONTACT). (01)

12 RAW MATERIAL LENGTH GIVEN IN THE TABLE IS INDICATIVE ONLY, HOWEVER OPTIMUM LENGTH OF RAW MATERIAL SHALL BE USED.

13. DIMENSIONAL TOLERANCES SHALL BE IN LINE WITH DIN 2095 (07) AND 2096

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC	A/C	UNIT	UNIT WT / QTY	GR	ZONE

REV	DATE	ALTERED	CHECKED
05	24.5.89	R. SRINIVASAN	R. ANANTH

NOTE 01 & 02 REVISED. NOTE 12 ADDED. RAW MATERIAL LENGTH ADDED IN TABLE. 'L' FOR VAR NO. 09 (2500/160) REVISED FROM 402 TO 435. IN NOTES DRG NO 4.80.999.99037 IS REPLACED BY TDC:PC:IND:006.

REV	DATE	ALTERED	CHECKED
04	11.6.88	R SRINIVASAN	

ZONE NOTE NO. 01 ALTERED.

REV	DATE	ALTD:	CHD:
03	09-5-'88	R.	

DIMENSIONS ALTERED FOR VARIANT NO. 05.

REV	DATE	ALTERED	CHECKED
02	18.04.88	R. SRINIVASAN	

ZONE DIMENSIONS ALTERED FOR VARIANT NO. 08

REV	DATE	ALTERED	CHECKED
01	01-01-'88	R.S.Giri	M.M.Mani

ZONE DIMENSIONS IN TABLE ALTERED FOR VARIANT NOS. 03, 06, 07, 12, 13 & 14. NOTE NO. 10 & 11 ADDED. ALL REVISIONS MARKED AS (01).

TYPE OF PRODUCT OR NAME OF CUSTOMER | PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF VAR
DRN	R.Seshagiri		24-09-87	15
CHD	M.Masilamani			
APPD	J.Jude			

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/ OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER TABLE		11

TITLE: SPRINGS FOR PIPE HANGERS (DEFLECTION 160 MM)

CARD CODE: U 01

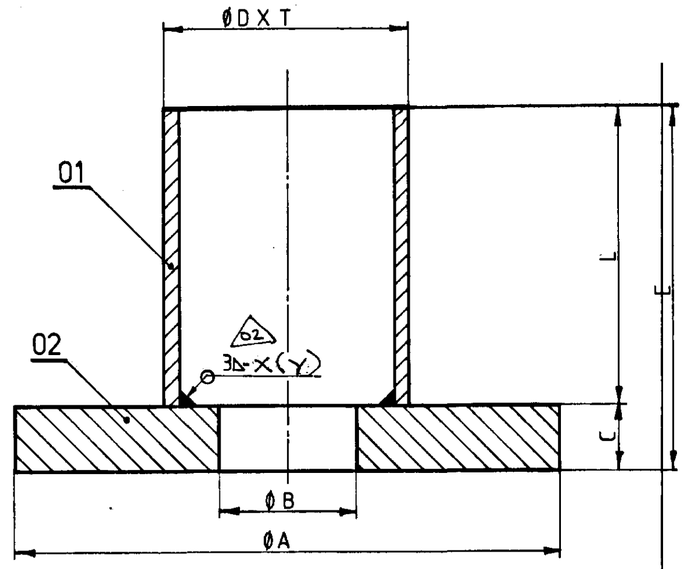
DRAWING No: 2-80-999-99117 REV 07

SIZE A2

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 2-80-999-99129

NOTES:-
01. EACH VARIANT OF THIS ASSEMBLY SHALL CONTAIN CORRESPONDING VARIANT OF THE PARTS.
02 ELECTRODE TO BE USED: E 7018.



VAR.NO	ØD x T (01)	Ø A	Ø B	C	L (03)	E (03)	TOTAT WEIGHT OF ASSY (KG)	3D-X(Y) (02) (WELD SIZE)	REMARKS
01	Ø63,5 x 3,2	90	20	5	~~73~~ ~~55~~ 55 (04)	~~78~~ ~~70~~ 60 (04)	0,631	3D-20(25)	
02	Ø89,5 x 4,85	130	20	5	~~60~~ ~~60~~ 50 (04)	~~73~~ ~~65~~ 55 (04)	1,195	3D-20(40)	
03	Ø51,0 x 4,0	90	20	5	~~140~~ ~~132~~ 112 (04)	~~145~~ ~~137~~ 117 (04)	0,969	3D-15(20)	
04	Ø63,5 x 3,2	100	20	6	~~156~~ ~~148~~ 128 (04)	~~161~~ ~~154~~ 134 (04)	1,197	3D-20(25)	
05	Ø76,0 x 3,25	125	25	6	~~161~~ ~~153~~ 133 (04)	~~167~~ ~~159~~ 139 (04)	1,489	3D-20(35)	
06	Ø76,0 x 3,25	130	25	8	~~155~~ ~~147~~ 127 (04)	~~163~~ ~~155~~ 135 (04)	1,703	3D-20(35)	
07	Ø113,9 x 3,65	170	30	10	~~153~~ 145	~~163~~ 155	3,239	3D-30(50)	
08	Ø89,5 x 4,85	150	35	12	~~238~~ 230	~~250~~ 242	4,061	3D-25(35)	
09	Ø108,0 x 8,0	180	35	16	~~291~~ 283 (01)	~~307~~ 299 (01)	8,815 (01)	3D-30(40)	
10	Ø113,9 x 3,65	200	40	16	~~311~~ 303	~~327~~ 319	6,862	3D-30(50)	
11	Ø166,5 x 4,85	286	45	16	~~282~~ 274	~~298~~ 290	13,102	3D-40(80)	
12	Ø210,0 x 9,65	330	60	20	~~318~~ 310	~~338~~ 330	28,146	3D-40(80)	
13	Ø219,1 x 6,35	360	70	25	~~406~~ 398	~~431~~ 423	32,731	3D-50(80)	
14	Ø140,8 x 4,85	290	80	32	~~747~~ 733	~~773~~ 765	27,330	3D-40(60)	
15	Ø166,5 x 4,85	336	100	36	~~890~~ 882	~~926~~ 918	39,926	3D-40(80)	

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A / C	UNIT	UNIT WT / QTY	C.S	ZONE
	02	MIDDLE PLATE		3-80-999-99140.							
	01	INNER GUIDE PIPE		3-80-999-99154.							
01 to 15		MIDDLE PLATE ASSY.		2-80-999-99129.		WELDMENT.					

REV	DATE	ALTD / APPD	DIMENSIONS
04	23/2/2000		DIMENSIONS 'E' & 'L' REDUCED BY 10MM FOR VAR NOS. 01 & 02 AND BY 20MM FOR VAR. NOS 03 TO 06, AS PER SHOP FEEDBACK.
03	11/5/99		DIMENSIONS 'E & L' REDUCED BY 8 MM FOR ALL VARIANTS AS PER SHOP FEED BACK.
02	28/11/94	ALTERED / APPROVED	WELD LENGTH ALTERED. WELD LENGTH INDICATED IN THE TABLE FOR ALL VARIANTS.
01	13.6.89	ALTERED R. SRINIVASAN, CHECKED	ØD x T REVISED, FOR VAR NO. 09 FOLLOWING ALTERED DIM 'L' - FROM 263 TO 291 DIM 'E' - FROM 279 TO 307 WEIGHT - FROM 8.230 TO 8.815

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF VAR
DRN	P.Sakthivel		01.06.88	
CHD	M.Masilamani			
APPD	J.Jude		120988	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/ OLD DRG	ITEM No.
	C/M/F	NTS			

TITLE: MIDDLE PLATE ASSEMBLY

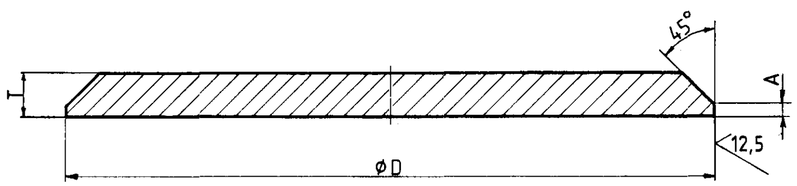
CARD CODE: U 01

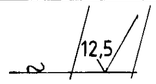
DRAWING No.: 2-80-999-99129

REV: 04

SIZE A2

DRAWING No. 2-80-999-99130





NOTES:

~~03 EQUIVALENT MATL IS 226, IS 2062~~

~~02 THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15µM ON ONE SIDE ON WHICH LUG PLATE (DRG NO 2-80-999-99138) IS WELDED, PRIOR TO GALVANISING.~~

VAR. NO.	ØD	T	A	REMARKS
01	105	5	1	
02	155	5	1	
03	105	5	1	
04	105	5	1	
05	155	5	1	
06	155	8	3	
07	204	8	2	
08	155	10	5	
09	204	12	6	
10	204	16	10	
11	306	16	8	
12	338	20	12	
13	385	25	15	
14	306	32	24	
15	338	36	28	

VARIANT No	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A / C	UNIT	UNIT WT / QTY	GS	ZONE
	15	PLATE Ø338 T=36		2-80-999-99130		15-011-124 / IS2062 Fe410WB	C		25,357		
	14	PLATE Ø306 T=32				15-011-130 / IS2062 Fe410WB	C		18,474		
	13	PLATE Ø385 T=25				15-011-081 / IS2062 Fe410WB	C		22,847		
	12	PLATE Ø338 T=20				15-011-150 / IS2062 Fe410WA	C		14,087		
	11	PLATE Ø306 T=16				15-011-026 / IS2062 Fe410WA	C		9,237		
	10	PLATE Ø204 T=16				15-011-026 / IS2062 Fe410WA	C		4,,1,0,5		
	09	PLATE Ø204 T=12				15-011-132 / IS2062 Fe410WA	C		3,,0,7,9		
	08	PLATE Ø155 T=10				15-011-098 / IS2062 Fe410WA	C		1,,4,8,1		
	07	PLATE Ø204 T=8				15-011-027 / IS2062 Fe410WA	C		2,,0,5,3		
	06	PLATE Ø155 T=8				15-011-027 / IS2062 Fe410WA	C		1,,1,8,5		
	05	PLATE Ø155 T=5				15-011-029 / IS2062 Fe410WA	C		0,,7,4,1		
	04	PLATE Ø105 T=5				15-011-029 / IS2062 Fe410WA	C		0,,3,4,0		
	03	PLATE Ø105 T=5				15-011-029 / IS2062 Fe410WA	C		0,,3,4,0		
	02	PLATE Ø155 T=5				15-011-029 / IS2062 Fe410WA	C		0,,7,4,1		
	01	PLATE Ø105 T=5				15-011-029 / IS2062Fe410WA	C		0,,3,4,0		

REV	DATE	ALTD:	APPD:	NOTE
03	04-01-2000			MATERIAL CHANGED IN BOM FROM BMC20 & BMC16 TO IS2062 Fe410WA & IS2062 Fe410WB RESPECTIVELY. NOTE 01 DELETED.
02	18/2/94			NOTE 02 DELETED.
01	23.08.88	ALTERED	CHECKED	END CHAMFERING DETAILS ADDED.

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	R.Seshagiri		11-02-88
CHD	M.Masilamani		18/6/88
APPD	J.Jude		210688

No. OF VAR: 15

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/ OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002 & 1-80-999-99003.	02

TITLE: TOP PLATE

CARD CODE: U 01

DRAWING No.: 2-80-999-99130

REV: 03

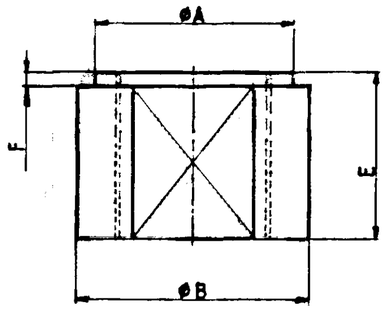
SIZE A2

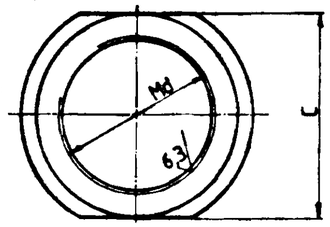
FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-228/C

DRAWING No. 2-80-999-99131

12,5 / 6,3





VAR. NO.	øA	øB	C	Md	E	F	REMARKS
01 TO 04	17	20	17	M12×1.75	10	2	
05 & 06	22	25	22	M16×2.0	14	2	
07	27	32	27	M20×2.5	18	2	
08 & 09	30	36	30	M24×3.0	20	2	
10	39	45	39	M30×3.5	26	3	
11	46	54	46	M36×4.0	32	3	
12	60	70	60	M48×5.0	42	3	
13	△65	84	65	M56×4.0	50	3	
14	75	100	75	M68×4.0	63	3	
15	△95	120	95	M85×4.0	80	3	

NOTES:

01. MATL. EQUIVALENT: IS-1875 CL.3. (OR) IS-961 Fe 540 WHT (OR) BS 970 080 M40
02. THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
△02 04. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR No.	MATL CODE / MATL SPEC.	A / C.	UNIT	UNIT WT / QTY	GS	ZONE
15		ROUND ø125 L-80		2-80-999-99131		15-339-281 / SA-105	C		3,,0,9,0		
14		ROUND ø125 L-63				15-339-281 / SA-105	C		1,,7,6,0		
13		ROUND ø100 L-50				15-339-134 / SA-105	C		1,,0,4,0		
12		ROUND ø 80 L-42				15-339-144 / SA-105	C		0,,6,2,0		
11		ROUND ø63 L-32				15-339-143-65 / SA-105	C		0,,2,9,0		
10		ROUND ø50 L-26				15-339-142 / SA-105	C		0,,1,7,0		
09 & 08		ROUND ø40 L-20				15-339-141 / SA-105	C		0,,0,8,0		
07		ROUND ø36 L-18				15-339-280 / SA-105	C		0,,0,6,0		
06 & 05		ROUND ø32 L-14				15-339-140 / SA-105	C		0,,0,3,0		
04 to 01		ROUND ø 25 L-10				15-339-139 / SA-105	C		0,,0,1,0		

REV	DATE	ALTD:	APPD:	NOTE: 04. ADDED.
03	15/10/98			

REV	DATE	ALTERED / CHECKED	ZONE	
02	01/11/89			In Note No:-01 MATL BS 970 EN8 Changed to BS 970 080 M40.

REV	DATE	ALTERED / CHECKED	ZONE	
01	06.07.88			FOR VAR. Nos. 13 & 15, DIMENSION 'A' ALTERED FROM 63 TO 65 AND 93 TO 95 RESPECTIVELY. IN NOTE 01, MATL BS 970 EN 8 ADDED

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF VAR
DRN	R.Seshagiri		16-02-88	15
CHD	M.Maslamani		18/6/88	
APPD	J.Jude		21.06.88	

DEPT CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY/ OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002 & 1-80-999-99003.	06

TITLE: CENTERING NUT

CARD CODE: U 01

DRAWING No.: 2-80-999-99131

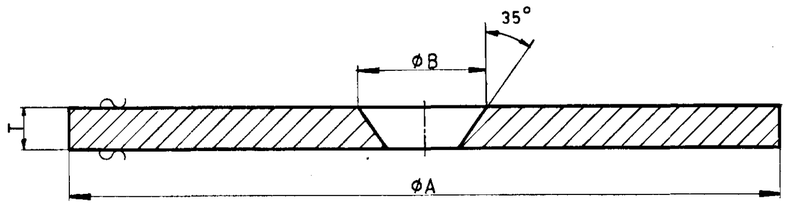
REV: 03

SIZE A2

DRAWING NO. 2-80-999-99133

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

12.5



VAR.NO.	ØA	ØB		T	REMARKS
01	100	19.0		5	
02	150	19.0		5	
03	100	19.0		5	
04	100	20.4		6	
05	150	24.4		6	
06	150	27.2		8	
07	200	34.0		10	
08	150	40.8		12	
09	200	46.4		16	
10	200	52.4		16	
11	300	58.4		16	
12	330	76.0		20	
13	380	91.0		25	
14	290	110.0		32	
15	336	135.4		36	

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A / C	UNIT	UNIT WT / QTY	GS	ZONE
	15	PLATE Ø336 T-36		2-80-999-99133		15-011-124 IS:2062 Fe 410B	C		17.362		
	14	PLATE Ø290 T-32				15-011-130 IS:2062 Fe 410B	C		15.030		
	13	PLATE Ø380 T-25				15-011-081 IS:2062 Fe 410B	C		21.424		
	12	PLATE Ø330 T-20				15-011-150 IS:2062 Fe 410A	C		12.954		
	11	PLATE Ø300 T-16				15-011-026 IS:2062 Fe 410A	C		8.658		
	10	PLATE Ø200 T-16				15-011-026 IS:2062 Fe 410A	C		3.778		
	09	PLATE Ø200 T-16				15-011-026 IS:2062 Fe 410A	C		3.824		
	08	PLATE Ø150 T-12				15-011-132 IS:2062 Fe 410A	C		1.309		
	07	PLATE Ø200 T-10				15-011-098 IS:2062 Fe 410A	C		2.421		
	06	PLATE Ø150 T-8				15-011-027 IS:2062 Fe 410A	C		1.086		
	05	PLATE Ø150 T-6				15-011-092 IS:2062 Fe 410A	C		0.817		
	04	PLATE Ø100 T-6				15-011-092 IS:2062 Fe 410A	C		0.360		
	03	PLATE Ø100 T-5				15-011-029 IS:2062 Fe 410A	C		0.301		
	02	PLATE Ø150 T-5				15-011-029 IS:2062 Fe 410A	C		0.687		
	01	PLATE Ø100 T-5				15-011-029 IS:2062 Fe 410A	C		0.301		

REV	DATE	ALTERED / CHECKED	ZONE
01	22/10/96	James / [illegible]	A

'A' Dimensions & Weight Changed. Matl. Spec. changed to IS:

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	R.Seshagiri	R. Seshagiri	23-02-88
CHD	M.Masilamani	M. Masilamani	15/4/88
APPD	J.Jude	J. Jude	21.06.88

No. OF VAR: 15

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/ OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM		08

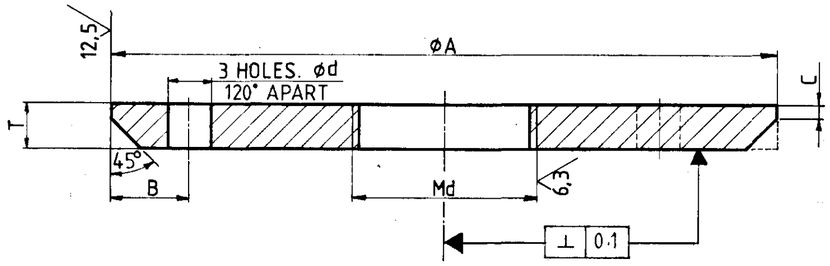
TITLE	CARD CODE	DRAWING No.	REV
SPRING PLATE	U 01	2-80-999-99133	01

SIZE A2

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 2-80-000-

2-80-999-99135



12,5 6,3

NOTES:

~~01 EQUIVALENT MATL. IS 226, IS 2062.~~

~~02 THIS COMPONENT SHALL BE ELECTRO-GALVANISED TO DEPTH OF 15 µM ON SURFACE MARKED ⊛ AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.~~

~~03 THREAD MATCHING SHALL BE DONE AFTER GALVANISING.~~

~~04 FOR VAR. NO. 11 TO 15, THE DIMN. 'A' INDICATED IS SUITABLE FOR HAVING PIPE THICKNESS OF 6,35mm. FOR THICKNESS HIGHER THAN 6,35 mm, THE O.D OF THE BOTTOM PLATE IS TO BE SUITABLY MACHINED TO HAVE THE DIMN. 'A', TO BE APPROX. 2mm LESS THAN THE I.D. OF THE HOUSING.~~

VAR.NO.	ØA	Md	C	T	B	Ød
01	105	M24X1.5	1	5	8,0	5
02	155	M24X1.5	1	5	11,0	5
03	105	M24X1.5	1	5	8,0	5
04	105	M24X1.5	1	5	8,0	5
05	155	M30X1.5	1	5	11,0	5
06	155	M30X1.5	1	6	11,0	6
07	204	M36X1.5	2	8	12,0	6
08	155	M42X1.5	5	10	31,0	8
09	204	M42X1.5	6	12	15,0	8
10	204	M50X1.5	10	16	38,0	10
11	~~309~~ 306 (06)	M58X1.5	8	16	14,0	10
12	338	M75X2 (04)	12	20	62,0	12
13	~~392~~ 385 (06)	M90X2.0	10	20	18,0	12
14	309	M105X2.0	24	32		12
15	338	M125X2.0	24	32		12

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A/C	UNIT	UNIT WT / QTY	GS	ZONE
	15	PLATE Ø338 T-32		2-80-999-99135		15-011-130 / IS2062 Fe410WB	C		19092		
	14	PLATE Ø309 T-32				15-011-130 / IS2062 Fe410WB	C		16328		
	13	PLATE ~~Ø392~~ Ø385 (06) T-20				15-011-150 / IS2062 Fe410WA	C		17774		
	12	PLATE Ø338 T-20				15-011-150 / IS2062 Fe410WA	C		13242		
	11	PLATE ~~Ø309~~ Ø306 (06) T-16				15-011-026 / IS2062 Fe410WA	C		9013		
	10	PLATE Ø204 T-16				15-011-026 / IS2062 Fe410WA	C		3,8,0,8		
	09	PLATE Ø204 T-12				15-011-132 / IS2062 Fe410WA	C		2,9,1,4		
	08	PLATE Ø155 T-10			(07)	15-011-098 / IS2062 Fe410WA	C		1,3,5,6		
	07	PLATE Ø204 T-8				15-011-027 / IS2062 Fe410WA	C		1,9,6,9		
	06	PLATE Ø155 T-6				15-011-092 / IS2062 Fe410WA	C		0,8,5,8		
	05	PLATE Ø155 T-5				15-011-029 / IS2062 Fe410WA	C		0,7,1,1		
	04	PLATE Ø105 T-5				15-011-029 / IS2062 Fe410WA	C		0,3,1,7		
	03	PLATE Ø105 T-5				15-011-029 / IS2062 Fe410WA	C		0,3,1,7		
	02	PLATE Ø155 T-5				15-011-029 / IS2062 Fe410WA	C		0,7,1,5		
	01	PLATE Ø105 T-5				15-011-029 / IS2062 Fe410WA	C		0,3,1,7		

REV	DATE	ALTERED / CHECKED	ZONE
07	04-01-2000	APPD: MATERIAL CHANGED IN BOM FROM BMC20 & BMC16 TO IS 2062 Fe410WA & IS 2062 Fe410WB RESPECTIVELY. NOTE-01 DELETED.	
06	11/5/98	APPD: FOR VAR. NO 5, 11 & 13 DIMENSION ØA ALTERED AS SHOWN WITH (06).	
05	6/11/95	APPD: NOTE 02 DELETED	
04	7/6/94	ALTD: APPD: NOTES 03 & 04 DELETED. THREAD SIZE ALTD FROM M75X1.5 TO M75X2, FOR VAR. 12.	
03	18/2/94	ALTD: APPD:	
02	21.10.88	ALTERED: CHECKED: NOTE : 4. ADDED.	
01	23.08.88	ALTERED CHECKED: END CHAMFERING DETAILS ADDED. DIMENSION 'B' AND HOLE DIA 'd' CHANGED.	

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	R.Seshagiri		24-02-88
CHD	M.Masilamani		18.6.88
APPD	J.Jude		210688

No. OF VAR: 15

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/ OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002 & 1-80-999-99003	03

TITLE: BOTTOM PLATE

CARD CODE: U 01

DRAWING No.: 2-80-999-99135

REV: 07

SIZE A2

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 2-80-999-99138

05-228/C

6.3 12.5

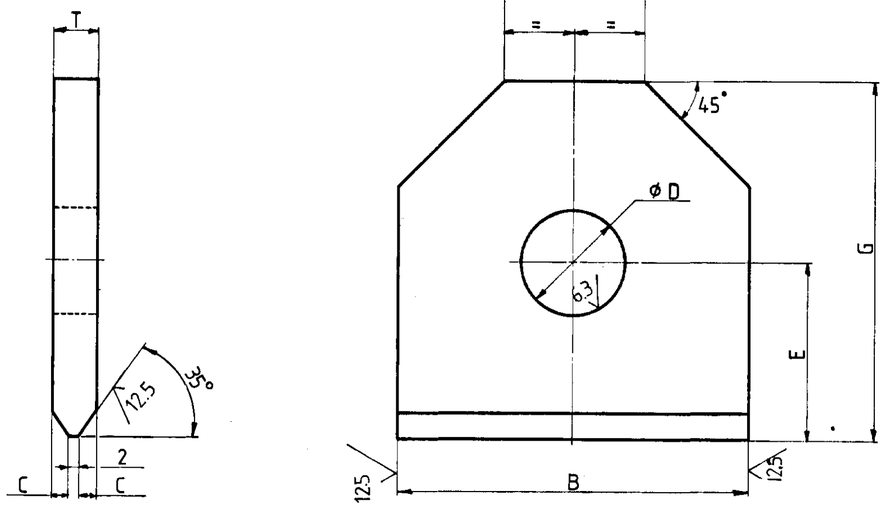
NOTES:

04 ~~IS:2062 Gr.A FOR BMC20 (UPTO 20mm THICK) & Fe410WA FOR BMC16 (THICKNESS 25mm & ABOVE)~~

05 ~~01 EQUIVALENT MATERIAL : IS:2062 Gr.B Fe410WB FOR BMC16 (THICKNESS 25mm & ABOVE)~~

~~02 THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15 µM. AFTER~~

03 ~~WELDING WITH TOP PLATE DRG. 2-80-999-99130~~



VAR. NO.	A	B	C	ØD	E	G	T	REMARKS
01 to 04	16	25	1,5	12,5	30	50	5	✓
05 & 06	22	33	2,0	16,5	30	60	6	
07	26	41	3,0	20,5	35	70	8	
04 08 & 09	50	74	5,0	24,5	40	80	12	
04 10	68	101	7,0	33,5	50	100	16	
04 11	82	122	9,0	40,5	60	120	20	
04 12	102	152	11.5	50,5	77	154	25	
04 13	122	182	15.0	60,5	90	180	32	
04 ~~14~~	~~90~~	~~142~~	~~15.0~~	~~70,5~~	~~107~~	~~214~~	~~32~~	
04 ~~15~~	~~108~~	~~172~~	~~17.0~~	~~85,5~~	~~132~~	~~264~~	~~36~~	

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A C	UNIT	UNIT WT / QTY	GS	ZONE
04 ~~15~~		~~PLATE 36×172×264~~		2-80-999-99138		~~15-011-124~~ BMC-16	E		1,0 9,0 0		
04 ~~14~~		~~PLATE 32×142×214~~				~~15-011-130~~ BMC-16	E		6 4 4 7		
04 13		PLATE. 32×182×180.		2-80-999-99138		15-011-130 IS 2062 Fe 410WB	C		7 2 8 0		
04 12	-	PLATE. 25×152×154.				15-011-081 IS 2062 Fe 410WB	C		4 7 8 0		
04 11		PLATE. 20×122×120.				15-011-150 IS 2062 Fe 410WA	C		2 0 3 0		
04 10		PLATE. 16×101×100.				15-011-026 IS 2062 Fe 410WA	C		1 1 2 0		
04 09 & 08		PLATE. 12×74×80.			05	15-011-132 IS 2062 Fe 410WA	C		0 5 0 0		
07		PLATE. 8×41×70				15-011-027 IS 2062 Fe 410WA	C		0 1 5 6		
06 & 05		PLATE. 6×33×60				15-011-092 IS 2062 Fe 410WA	C		0 0 8 1		
04 to 01		PLATE. 5×25×50				15-011-029 IS 2062 Fe 410WA	C		0 0 4 6		

REV	DATE	ALTD:	APPD:	DIMENSIONS, WT & MATL CODE ALTD FROM
04	7/6/94			

VAR NO.	A	B	C	T	Wt	MATL CODE IS 011-
08,09	32	49	4	10	0.268	-098
10	42	67	5	12	0.533	-132
11	52	82	7	16	1.046	-026
12	64	102	9	20	2.079	-150
13	76	122	11.5	25	3.689	-081

- MATL CHANGED FOR VAR-12 FROM BMC20 TO BMC16.
- VAR. 14 & 15 CANCELLED.
- IN NOTE-1 IS:226 REMOVED; IS 2062 GR A & B INDICATED

REV	DATE	ALTD:	APPD:
05	04.01.2000		

MATERIAL CHANGED IN BOM FROM BMC20 & BMC16 TO IS2062 Fe410WA & IS 2062 Fe410WB RESPECTIVELY, NOTE-01 DELETED

REV	DATE	ALTD:	APPD:
03	18/2/94		

NOTE-02 DELETED.

REV	DATE	ALTERED	CHECKED
02	17-07-89		

IN BOM, PLATE SIZE ALTERED FOR VAR-NO 01 TO 07.

REV	DATE	ALTERED	CHECKED
01	08.07.88		

ZONE

FOR VAR. Nos. 01 TO 07 DIMENSIONS E & G AND WEIGHT ALTERED.

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

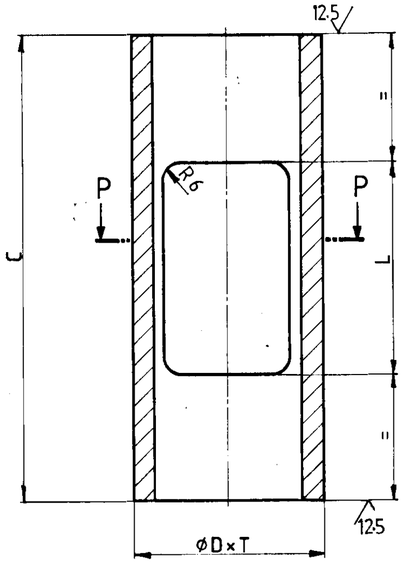
	NAME	SIGN	DATE	No. OF VAR
DRN	R.Seshagiri		07-04-88	15
CHD	M.Masilamani		08/6/88	
APPD	J.Jude		21.06.88	

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY/ DED DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002 & 1-80-999-99003.	09

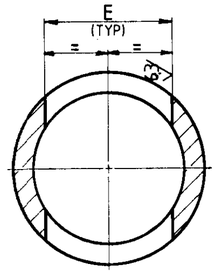
TITLE	CARD CODE	DRAWING No.	REV
LUG PLATE	U 01	2-80-999-99138	05

DRAWING No. 2-80-999-99139

05-228/C



SECTION - PP



NOTE :

01. ACCEPTABLE EQUIVALENT MATL : SA-192 FOR SA-210, Gr-A1
SA-106, Gr-C FOR SA-106, Gr-B.

VAR. NO.			C	ØD×T	E	L		REMARKS
01 to 04			144	ø44,5×5	30	100		
05 & 06			146	ø63,5×5,6	46	86		
07			218	ø63,5×5,6	46	160		
08 & 09			222	ø76,1×7,1	46	155		
10			246	ø88·9×5,49	60 03	170		
11			252	ø108×8,0	80	160		
12			296	ø127×8·0	90	165		
13			304	ø127×8·0	90	155		
14			354	ø219,1×22,2	160	220		
15			371	ø219,1×22,2	160	220		

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A C	UNIT	UNIT WT / QTY	GS	ZONE
	15	PIPE ø219,1× 22,2 L=371		2-80-999-99139		15 082 219 / SA 106 Gr B	C		26,000 / 1		
	14	PIPE ø219,1×22,2. L=354				15-082-219 / SA 106 Gr.B	C		24,100 / 1		
	13	PIPE ø127×8·0. L=304				15-082-178 / SA 106 Gr.B	C		7,600 / 1		
	12	PIPE ø127×8·0 L=296				15-082-178 / SA 106 Gr.B	C		7,130 / 1		
	11	PIPE ø108×8,0. L=252				15-082-164 / SA 106 Gr.B	C		3,070 / 1		
	10	PIPE ø88·9×5·49; L=246				15-082-138 / SA 106 Gr.B	C		2,930 / 1		
	09 & 08	PIPE ø76·1×7·1 L=222				15-086-124 / SA 210 Gr.A1	C		1,330 / 1		
	07	PIPE ø63,5×5,6. L=218				15-086-116 / SA 210 Gr.A1	C		1,280 / 1		
	06 & 05	PIPE ø63,5×5,6. L=146				15-086-116 / SA 210 Gr.A1	C		0,931 / 1		
	04 to 01	PIPE ø44,5×5,0. L=144				15-086-071 / SA 210 Gr.A1	C		0,536 / 1		

REV	DATE	ALTD	REV	DATE	ALTERED	REV	DATE	ALTERED
03	30/09/88	CHED	02	17/7/89	CHECKED	01	20.07.88	CHECKED

FOR VAR-NO. 10 SLOT DIMENSION 'E' ALTERED FROM 80 TO 60 mm.

ØDxT ALTERED AS FOLLOWS:

VAR-NO	FROM	TO
08/09	63·5×5·6	76·1×7·1
10	108×8	88·9×5·49
12/13	127×12·5	127×8·0

CORRESPONDINGLY MATL CODE ALTERED.

ZONE

DIMN. 'A' & 'B' AND TOLERANCE 'H7' DELETED.

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	No. OF VAR
DRN	R.Seshagiri		14-4-88	15
CHD	M.Masilamani		19/6/88	
APPD	J.Jude		21/6/88	

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	REF TO ASSY/OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER BOM		—

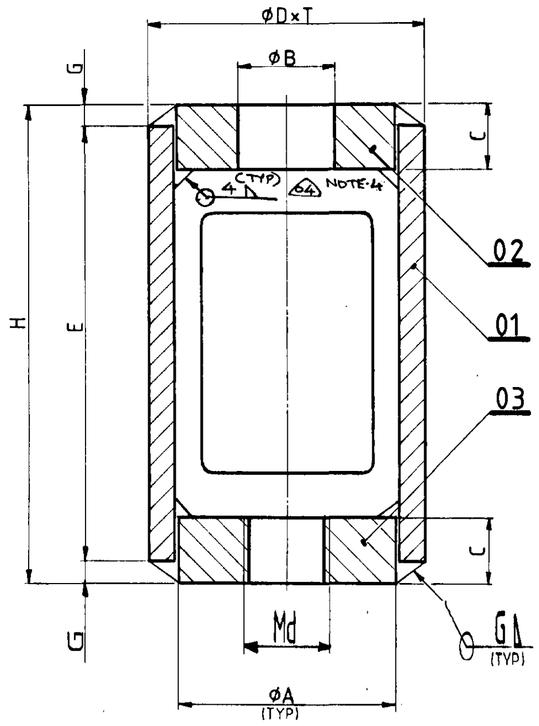
TITLE: TURN BUCKLE BODY

CARD CODE: U 01 | DRAWING No.: 2-80-999-99139 | REV: 03

SIZE A2

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 2-80-999-99140



VAR.NO	ØA	ØB	C	Md	ØD x T	E	G	H	WEIGHT(Kg.)
01 to 04	33	14	16	M12x1,75	Ø44,5x 5,0	144	5	154	0,745
05 & 06	50	18	25	M16x 2,0	Ø 63, 5x 5,6	146	6	158	1,708
07	50	22	25	M20x2,5	Ø63,5x 5,6	218	6	230	2,009
08 & 09	60 03	27	25	M24x3,0	Ø76.1x7.1	222	6	234	1,995
10	76 03	33	36	M30x3,5	Ø88.9x5.49	246	8	262	6,494
11	91	40	36	M 36x4,0	Ø 108 x 8,0	252	8	268	6,433
12	109 03	52	56	M48x5,0	Ø127x8.0	296	12	320	13,160
13	109 03	60	56	M 56x4,0	Ø 127 x 8.0	304	12	328	13,033
14	174	72	85	M68x4,0	Ø219,1x22,2	354	22	398	53,180
15	174	90	85	M85x 4,0	Ø219,1x22,2	371	22	415	52,189

NOTE :-

01. EACH VARIANT OF THIS ASSEMBLY SHALL CONTAIN CORRESPONDING VARIANT OF THE PARTS.

02. ELECTRODE TO BE USED :- E 7018.

03. ELECTRO GALVANISING TO A DEPTH OF 15 µm TO BE DONE AFTER WELDING OF ITEM NO 02 & 03 TO ITEM NO 01. THREADED PART IS TO BE YELLOW CHROMOTISED TO 15µm & THREAD MATCHING SHALL BE DONE AFTERWARDS.

04. 'INSIDE WELDING' SHALL BE DONE CAREFULLY TO AVOID WELD SPATTER ETC, MAINLY ON THE INNER SURFACE OF ITEM NO. 02, ON WHICH THE NUT HAS TO BE ACCOMODATED; ALSO THE HOLE IN ITEM NO. 02 AND THE INTERNAL THREAD IN ITEM NO. 03 SHOULD NOT BE DISTURBED DURING 'INSIDE WELDING'.

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A / C	UNIT	UNIT WT / QTY	GS	INCL
	03	PLATE - 2		3-80-999-99151					1		
	02	PLATE - 1		3-80-999-99150					1		
	01	TURN BUCKLE BODY		2-80-999-99139					1		
15 to 01		TURN BUCKLE		2-80-999-99140		WELDMENT			1		

REV	DATE	ALTD / APPD	DESCRIPTION
04	04-01-2000		INSIDE WELDING OF ITEM NOS 02 & 03 WITH ITEM NO. 01 ADDED. NOTE - 04 ADDED
03	07/06/89	ALTERED / APPROVED	DIM ØA ALTERED AS FOLLOWS: VAR. 08/09 FROM 50 TO 60; 10 FROM 91 TO 76; 12/13 FROM 100 TO 109
02	17/7/89	ALTERED / CHECKED	ØDXT ALTERED AS FOLLOWS: VAR.No. 08/09 — 63.5x5.6 TO 76.1x7.1; 10 — 108 x 8 TO 88.9x5.49; 12/13 — 127x12.5 TO 127x8.0
01	20.07.88.	ALTERED / CHECKED	DIMN. 'A' ALTERED. CONNECTING DETAIL OF ITEMS 1&2 AND 1&3 ALTERED.

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	R.Seshagiri		15-4-88
CHD	M.Masilamani		18/6/88
APPD	J. Jude		210688

No. OF SHTS: 15

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY/OLD DRG	ITEM No.
PC	C/M/F	NTS	AS PER TABLE	1-80-999-99002 & 1 80 999 99003	15

TITLE: TURN BUCKLE

CARD CODE: U 01

DRAWING No.: 2-80-999-99140

REV: 04

SIZE: A2

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

2-80-999-99141

12.5

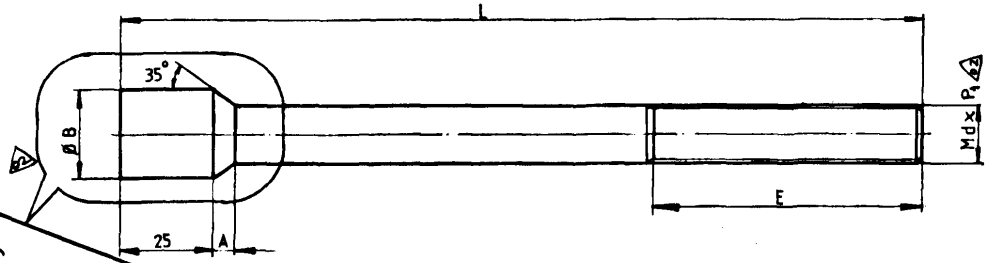
NOTES:

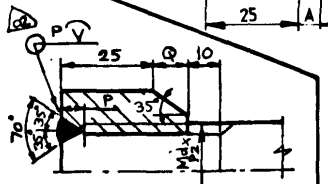
01. MATL. EQUIVALENT: IS-1875 CL.3. (OR) IS-961 Fe 540 WHT (OR) BS 970 080 M40 (03)

02 THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.

03 THREAD MATCHING SHALL BE DONE AFTER GALVANISING.

04. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE "SA105"





VAR NO.	P	Q	Md x P2	
01	2	3	M12x1.75	
02	2	3	M12x1.75	
03	2	3	M12x1.75	
04	3	4	M12x1.75	
05	4	4	M16x2	
06	4	6	M16x2	
07	5	7.5	M20x2.5	
08	5	9	M24x3	
09	5	13	M24x3	
10	8	12	M30x3.5	
11	8	13	M36x3	
12	10	17	M48x3	
13	12	22	M56x3	

ALTERNATIVE ARRANGEMENT (MADE OF 2 PIECES AND WELDED TOGETHER).
BOTH THE PIECES ARE OF MATERIAL SA105(c) & SUITABLE SIZES, MAINTAINING ALL DIMENSIONS.

VAR NO	A	ØB	Md x P1 (04)	E	L		REMARKS
01	5	19.0	M12x1.75	300	467		
02	5	19.0	M12x1.75	300	457		
03	5	19.0	M12x1.75	300	601		
04	6	20.4	M12x1.75	300	635		
05	6	24.4	M16x2.0	325	668		
06	8	27.2	M16x2.0	325	661		
07	10	34.0	M20x2.5	375	694		
08	12	40.8	M24x3.0	395	890		
09	16	46.4	M24x3.0	395	1006 (04)		
10	16	52.4	M30x3.5	450	1097		
11	16	58.4	M36x4.0	480	1071		
12	20	76.0	M48x5.0	565	1234		
13	25	91.0	M56x4.0	605	1466		
14	32	112.8	M68x4.0	730	—		
15	36	135.4	M85x4.0	820	—		

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL CODE / MATL SPEC.	A/C	UNIT	UNIT WT / QTY	GS	ZONE
	15	ROUND Ø165. L=		2_80_999_99141.		15-339-282 / SA_105	C				
	14	ROUND Ø125. L=				15-339-281 / SA_105	C				
	13	ROUND Ø100. L=1466				15-339-134 / SA_105	C		29 000		
	12	ROUND Ø80. L=1234				15-339-144 / SA_105	C		18 000		
	11	ROUND Ø63. L=1071				15-339-143 / SA_105	C		9 000		
	10	ROUND Ø63. L=1097				15-339-143 / SA_105	C		6200		
	09	ROUND Ø50. L=1006 (04)				15-339-142 / SA_105	C		(03) 3800		
	08	ROUND Ø50. L=890				15-339-142 / SA_105	C		3300		
	07	ROUND Ø36. L=694				15-339-280 / SA_105	C		1830		
	06	ROUND Ø32. L=661				15-339-140 / SA_105	C		1150		
	05	ROUND Ø25. L=668				15-339-139 / SA_105	C		1130		
	04	ROUND Ø22. L=635				15-339-343 / SA_105	C		0610		
	03	ROUND Ø22. L=601				15-339-343 / SA_105	C		0580		
	02	ROUND Ø22. L=457				15-339-343 / SA_105	C		0440		
	01	ROUND Ø22. L=467				15-339-343 / SA_105	C		0450		

REV	DATE	ALTD:	ALTERED	CHECKED	APPD:	NOTE
04	01/03/89					NOTE-04 ADDED
03	01/11/88					In Note No:- 01 MAT. BS 970 EN8 Changed to BS 970 080 M40
02	9/11/88					ALTERNATIVE ARRANGEMENT MADE OF 2 PIECES AND WELDED TOGETHER AT THE HEAD PORTION - ADDED. MAIN THREAD DIM 'Md' CHANGED TO 'Md x P1'.
01	13/6/88					FOR VAR. NO. 09 - DIMENSION 'L' ALTERED FROM 980 to 1006; WEIGHT ALTERED FROM 3.600 to 3.800 kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	R.Srinivasan		
CHD	M.Masilamani		
APPD	J.Jude.		12.09.88

No. OF VAR: 15

DEPT: PC | CODE | GRADE OF UN TOL. DIM: C/M/F | SCALE: NTS | WEIGHT (Kg): AS PER BOM | REF TO ASSY/ GA DRG: 1_80_999_99003 | ITEM No. 04

TITLE: SPINDLE BOLT. (SH-160) | CARD CODE: U 01 | DRAWING No. 2_80_999_99141 | REV 04

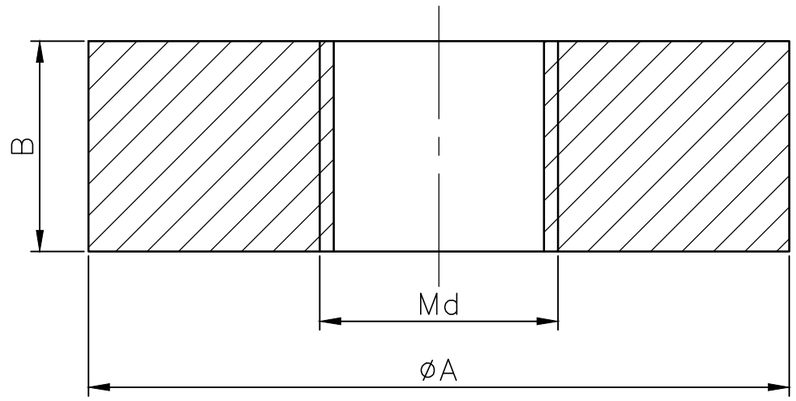
SIZE A2

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

08-228/C

DRAWING NO: 3-12-000-06295

12.5



NOTES:

01. MATL- EQUIVALENT:- SA 515 Gr.70. (OR) IS-961 Fe-540 WHT.

02."IS 1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF 'SA105'.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	øA	øB	Md	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT	UNIT WEIGHT / QUANTITY	GS
	13	ROUND ø125. L=56	109	56	M48x3		15-339-281 / SA-105			2.797	
	12	ROUND ø125. L=56	109	56	M36x3		15-339-281 / SA-105			3.084	
	11	ROUND ø100. L=36	91	36	M27x3		15-339-134 / SA-105			1.715	
	10	ROUND ø80. L=36	76	36	M27x3		15-339-144 / SA-105			1.803	
	09 & 08	ROUND ø63. L=25	60	25	M27x3		15-339-143 / SA-105			0.344	
	07	ROUND ø50. L=25	50	25	M27x3		15-339-142 / SA-105			0.371	
	06 & 05	ROUND ø50. L=25	50	25	M27x3		15-339-142 / SA-105			0.394	
	04 to 01	ROUND ø36. L=16	33	16	M14x2		15-339-280 / SA-105			0.107	

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

355-055

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

	NAME	SIGNATURE	DATE
DRN	R.GOBI		16.12.2014
CHD	THINESH KUMAR		16.12.2014
APPD	R.T		17.12.2014

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		3-80-999-99151

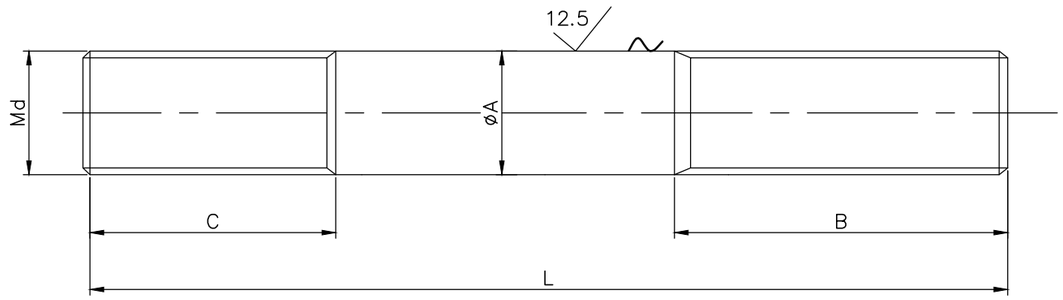
TITLE: PLATE-2 (FOR TURN BUCKLE)

DRAWING NO : 3-12-000-06295

REV 00

DRAWING NO: 3-12-000-06351

12.5



V.NO	MdxP	A	B	C	L	MATERIAL CODE	WEIGHT (kg).
01	M12x1.75	12	140	35	938	15-004-030	0.832
02	M12x1.75	12	140	35	938	15-004-030	0.832
03	M12x1.75	12	140	35	1021	15-004-030	0.906
04	M12x1.75	12	140	35	1021	15-004-030	0.906
05	M16x2	16	160	45	997	15-004-106	1.573
06	M16x2	16	160	45	997	15-004-106	1.573
07	M20x2.50	22	170	55	990	15-339-343	2.953
08	M24x3	25	180	65	1075	15-339-139	4.140
09	M24x3	25	180	70	1130	15-339-139	4.352
10	M30x3.50	32	200	80	1159	15-339-140	7.313
11	M36x4	36	210	95	1124	15-339-280	8.976
12	M48x5	48	260	120	1160	15-339-142	16.470
13	M56x4	56	270	145	1248	15-339-143	24.117

MATERIAL :

FOR VAR.No. 01 TO 06 IS 2062 E250A.

FOR VAR.No. 07 TO 15 – SA105.

NOTES :

01. MATERIAL EQUIVALENT :
IS 1875CL.3 OR IS 961 Fe540 WHT OR BS 970:080 M40.

02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15μM.
AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.

03. MATERIAL "IS 1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-055

	NAME	SIGNATURE	DATE
DRN	R.GOBI		16.12.2014
CHD	THINESHKUMAR		16.12.2014
APPD	R.T		17.12.2014

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		3-80-999-99186

TITLE
BOTTOM TIE ROD
(TYPE SAT 80)

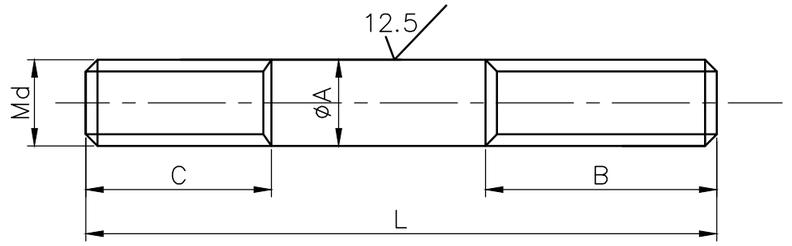
DRAWING NO : 3-12-000-06351

REV 00

DRAWING NO: 3-12-000-06486

VAR. NO.	MdxP	A	B	C	L	MATL CODE	WEIGHT (kg).
01	M12x1.75	12	140	35	1112	15-004-030	0.987
02	M12x1.75	12	140	35	1112	15-004-030	0.987
03	M12x1.75	12	140	35	1279	15-004-030	1.135
04	M12x1.75	12	140	35	1279	15-004-030	1.135
05	M16x2	16	160	45	1260	15-004-106	1.988
06	M16x2	16	160	45	1260	15-004-106	1.988
07	M20x2.5	22	170	55	1249	15-339-343	3.725
08	M24x3	25	180	65	1421	15-339-139	5.473
09	M24x3	25	180	70	1533	15-339-139	5.904
10	M30x3.5	32	200	80	1582	15-339-140	9.983
11	M36x4	36	210	95	1518	15-339-280	12.123
12	M48x5	48	260	120	1594	15-339-142	22.631
13	M56x4	56	270	145	1775	15-339-143	34.302

12.5



MATERIAL:

FOR VAR.No. 01 TO 06-IS 2062 E250A.

FOR VAR.No. 07 TO 15-SA105

NOTES:

1) MATL. EQUIVALENT: IS1875 CL.3 OR IS961 Fe 540 WHT OR BS 970 080 M40.
2) THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15µM. AND THREDED PORTIONS SHALL BE YELLOW CHROMATISED.
3) "IS 1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014
355-055

	NAME	SIGNATURE	DATE
DRN	R.GOBI		16.12.14
CHD	THINESH KUMAR		16.12.14
APPD	R.T		17.12.14

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		3-80-999-99190

TITLE

BOTTOM TIE ROD

(TYPE: SAT-160)

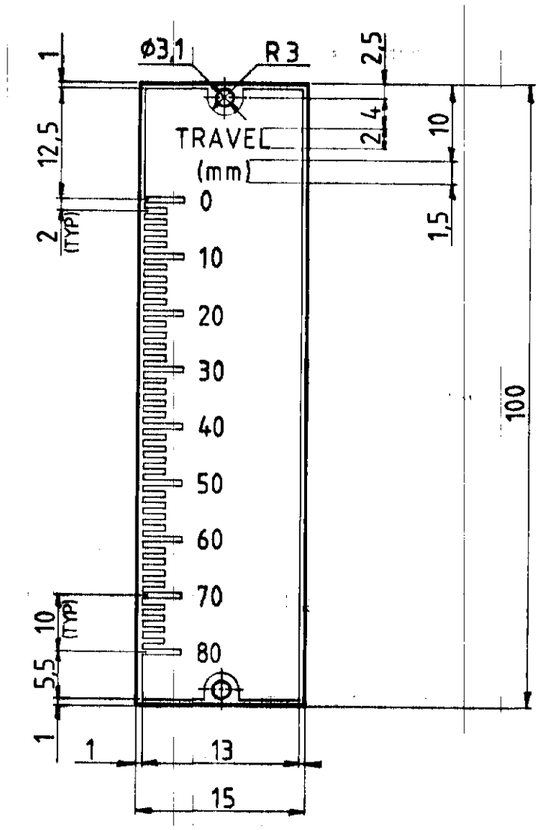
DRAWING NO : 3-12-000-06486

REV 00

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99117



* NOTES:-

01. LETTERING:- EURO STYLE - BOLD - EXTENDED.

02. FINISH:- LETTERS, GRADUATIONS AND BORDER SHALL BE BRIGHT WHITE WITH BLACK BACKGROUND.

03. PLATING:- PLATING SHALL BE CRACK RESISTANT SO THAT THE PLATING DOES NOT CRACK WHEN BENT.

04. ALL SHARP EDGES SHALL BE ROUNDED OFF.

△62 ~~05. THE~~ HOLE FOR FIXING THE TRAVEL SCALE SHALL ~~BE OF DIA 2.65mm TO SUIT~~ HAMMER DRIVE SCREWS Ø3×6, ON THE HOUSING.

VARIANT No.	ITEM No.	DESCRIPTION	DRAWING No.	ITEM	MATL. CODE	A	UNIT	UNIT WT.	GS
		SHEET 0.5 1 × 15 × 100 △01	3-80-999-99117		SA 240 TYPE 304 △01	C		0.012	
					MATL. SPEC.			QTY. 1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT, TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN	R.Seshagiri	R.Seshagiri	14-11-87	—
CHD	M.Masilamani			
APP	J.Jude			

DEPT	GRADE OF UNTOL DIM.	SCALE	WEIGHT (Kg)	REF TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	0,012		12

TITLE: TRAVEL SCALE (TYPE-A)

CARD CODE: 0 01

DRAWING No.: 3-80-999-99117

REV.: 02

REV	DATE	ALTD / APPD	ALTERED
02	02/03/2000		NOTE-05 DELETED.
01	10/2/2000		SHEET THICKNESS ALTERED FROM 1 MM TO 0.5 mm. MATL CODE REMOVED.

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99118

NOTES:-

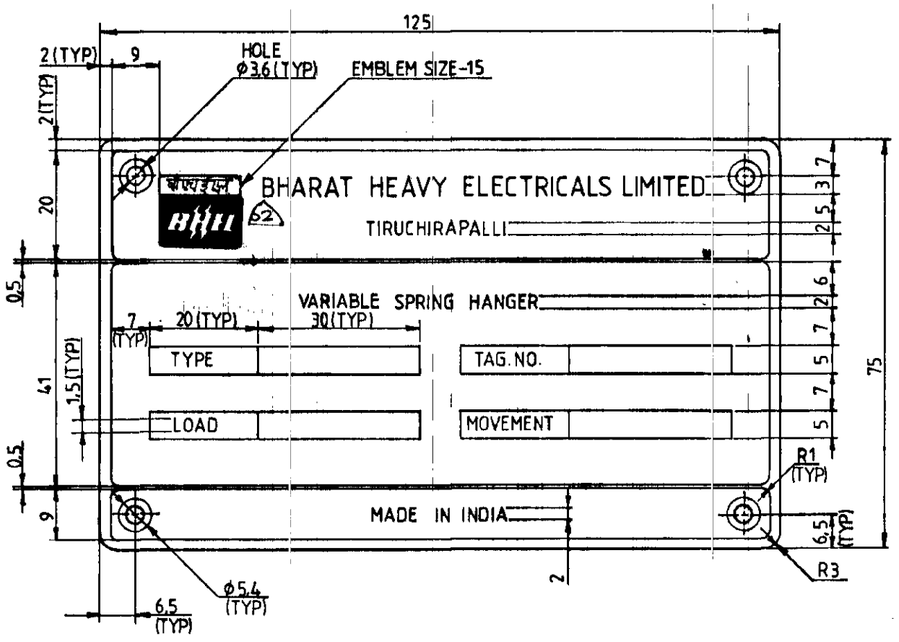
01. LETTERING :- EURO STYLE - BOLD - EXTENDED.

02. FINISH :- LETTERS AND BORDER SHALL BE BRIGHT WHITE WITH BLACK BACKGROUND.

03. PLATING :- PLATING SHALL BE CRACK RESISTANT SO THAT THE PLATING DOES NOT CRACK WHEN BENT.

04. SHARP EDGES SHALL BE ROUNDED OFF.

~~05. HOLES~~ FOR FIXING THE NAME PLATE SHALL BE OF DIA 2.65mm ~~TO SUIT THE HAMMER~~ DRIVE SCREWS $\phi 3 \times 6$, ON THE HOUSING. (02)



VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.		UNIT	
		SHEET 0.5 (02) x 75 x 125		3-80-999-99118	SA 240 TYPE 304 (01) C		0.074
					MATL. CODE / MATL. SPEC	A / C	UNIT WT. / QTY. 1

REV	DATE	ALTD	REV	DATE	ALTERED
02	02/03/2000	APPD.	01	10/2/2000	APPROVED
NOTE-05 DELETED. BHEL EMBLEM IN THE NAME PLATE ALTERED.			SHEET THICKNESS ALTERED FROM 1 MM, TO 0.5 MM. MATL CODE REMOVED.		

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

	NAME	SIGN	DATE	No. OF VAR.
Bharat Heavy Electricals Ltd. BOILER PLANT DIVISION TIRUCHIRAPALLI	P.SAKTHIVEL		18.07.88	
	M.MASILAMANI		18/7/88	–
	J.JUDE		21.07.88	

DEPT	UNTOL DIM.			REF TO ASSY/ OLD DRG.	ITEM No.
	±1/2	NTS	0,074		13

TITLE: NAME PLATE FOR VARIABLE SPRING HANGER

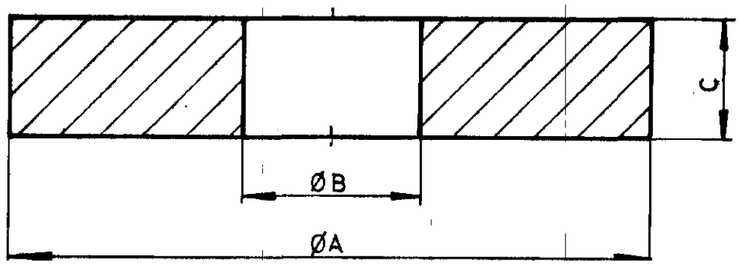
DRAWING No. 3-80-999-99118. REV. 02

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99140.



VAR. NO.	Ø A	Ø B	C				REMARKS
01	90	20	5				
02	130	20	5				
03	90	20	5				
04	100	20	6				
05	125	25	6				
06	130	25	8				
07	170	30	10				
08	150	35	12				
09	180	35	16				
10	200	40	16				
11	286	45	16				
12	330	60	20				
13	360	70	25				
14	290	80	32				
15	336	100	36				

VARIANT No.	ITEM No.	DESCRIPTION	QTY	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE	A/C	UNIT	UNIT. WT. / QTY.	GS
	15	PLATE Ø336 T-36		3-80-999-99140		15-011-124	C		22 838	
						IS 2062 Fe410WB			1	
	14	PLATE Ø290 T-32				15-011-130	C		15 330	
						IS 2062 Fe410WB			1	
	13	PLATE Ø360 T-25				15-011-081	C		19 219	
						IS 2062 Fe410WB			1	
	12	PLATE Ø330 T-20				15-011-150	C		12 984	
						IS 2062 Fe410WA			1	
	11	PLATE Ø286 T-16				15-011-026	C		7 687	
						IS 2062 Fe410WA			1	
	10	PLATE Ø200 T-16				15-011-026	C		3 787	
						IS 2062 Fe410WA			1	
	09	PLATE Ø180 T-16				15-011-026	C		3 075	
						IS 2062 Fe410WA			1	
	08	PLATE Ø150 T-12				15-011-132	C		1 657	
						IS 2062 Fe410WA			1	
	07	PLATE Ø170 T-10			6	15-011-098	C		1 726	
						IS 2062 Fe410WA			1	
	06	PLATE Ø130 T-8				15-011-027	C		0 803	
						IS 2062 Fe410WA			1	
	05	PLATE Ø125 T-6				15-011-092	C		0 555	
						IS 2062 Fe410WA			1	
	04	PLATE Ø100 T-6				15-011-092	C		0 355	
						IS 2062 Fe410WA			1	
	03	PLATE Ø90 T-5				15-011-029	C		0 237	
						IS 2062 Fe410WA			1	
	02	PLATE Ø130 T-5				15-011-029	C		0 508	
						IS 2062 Fe410WA			1	
	01	PLATE Ø90 T-5				15-011-029	C		0 237	
						IS 2062 Fe410WA			1	

REV	DATE	ALTERED / CHECKED
01	04-01-2000	

MATERIAL CHANGED IN BOM FROM 'BMC20' & 'BMC16' TO 'IS 2062 Fe410WA' & 'IS 2062 Fe 410 WB' RESPECTIVELY

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Srinivasan.		11 08 88	
CHD.	M.Masilamani.			
APD.	J.Jude.		120988	

DEPT.	ENGG. OF INDIG. ITEM	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: MIDDLE PLATE (SH-160)

CARD No. U 01

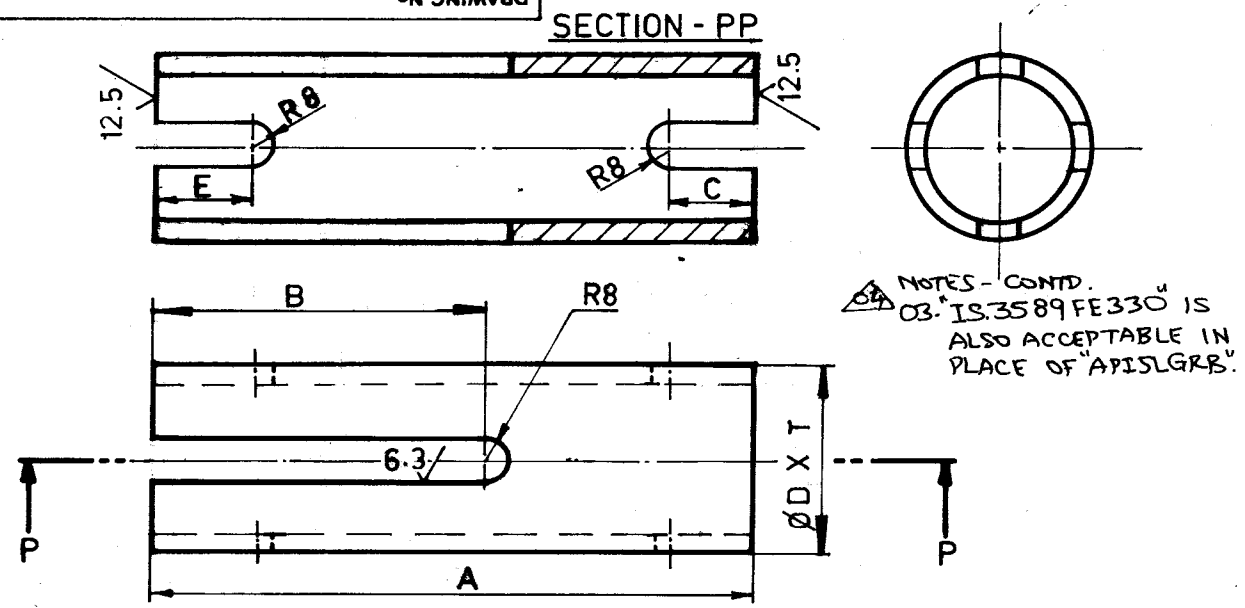
DRAWING No. 3-80-999-99140. REV. 01

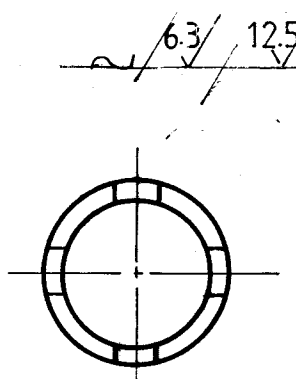
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99149





△A NOTES - CONTD.
03. "IS 3589 FE330" IS ALSO ACCEPTABLE IN PLACE OF "API 5L GR.B".

NOTES: 01. FOR VAR. NOS. 11 TO 15. THICKNESS OF PIPES 6.35mm IS ACCEPTABLE.
△A 02. THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH, SMOOTH.

VAR NO	ØD X T	A	B △02	C	E			REMARKS
01	113.9 X 3.65	393	~~225~~ 245	30	5			
02	166.5 X 4.85	385	~~225~~ 245	30	6			
03	113.9 X 3.65	527	~~225~~ 245	30	5			
04	113.9 X 3.65	561	~~225~~ 245	30	5			
05	166.5 X 4.85	573	~~225~~ 245	35	6			
06	166.5 X 4.85	569	~~230~~ 250	35	6			
07	219.1 X 6.35	573	~~230~~ 250	40	7			
08	166.5 X 4.85	749	~~230~~ 250	45	6			
09	219.1 X 6.35	869 △01	~~230~~ 250	55	7			
10	219.1 X 6.35	917	~~240~~ 260	60	7			
11	323.9 X 7.92	863	~~250~~ 260	70	9			
12	355.6 X 7.92	951	~~250~~ 260	90	9			
13	406.4 X 9.53	1146	~~250~~ 270	90	11			
14	323.9 X 7.92		~~350~~ 275	110	9			
15	355.6 X 7.92		~~350~~ 275	110	9			

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	S
15		PIPE Ø355.6 x 7.92		3-80-999-99149		15-938-217 / API 5L GR.B	C			
14		PIPE Ø323.9 x 7.92				15-938-199 / API 5L GR.B	C			
13		PIPE Ø406.4 x 9.53				15-938-172 / API 5L GR.B	C		106 / 105	
12		PIPE Ø355.6 x 7.92				15-938-217 / API 5L GR.B	C		64 / 150	
11		PIPE Ø323.9 x 7.92				15-938-199 / API 5L GR.B	C		52 / 858	
10		PIPE Ø219.1 x 6.35				15-938-194 / API 5L GR.B	C		30 / 166	
09		PIPE Ø219.1 x 6.35				15-938-194 / API 5L GR.B	C		△A 28 / 585	
08		PIPE Ø166.5 x 4.85				15-038-085 / IS-1239	C		14 / 143	
07		PIPE Ø219.1 x 6.35				15-938-194 / API 5L GR.B	C		18 / 767	
06		PIPE Ø166.5 x 4.85				15-038-085 / IS-1239	C		10 / 706	
05		PIPE Ø166.5 X 4.85				15-038-085 / IS-1239	C		10 / 783	
04		PIPE Ø113.9 x 3.65				15-038-089 / IS-1239	C		5 / 388	
03		PIPE Ø113.9 x 3.65				15-038-089 / IS-1239	C		5 / 051	
02		PIPE Ø166.5 x 4.85				15-038-085 / IS-1239	C		7 / 179	
01		PIPE Ø113.9 x 3.65				15-038-089 / IS-1239	C		3 / 727	

REV	DATE	ALTD:	APPD:	NOTE
03	14/9/2005			NOTE-02 ADDED.
04	6/10/2005			NOTE-03 ADDED

REV	DATE	ALTD	APPD	
02	10/2/2005			DIMENSION 'B' FOR SLOTS INCREASED BY 20 MM FOR ALL VARIANTS AS PER SHOP FEEDBACK.

REV	DATE	ALTERED	CHECKED	
01	19/6/89			DIMENSION 'A' ALTERED FROM 813 TO 869mm; WEIGHT ALTERED FROM 26.720 TO 28.585 kg [FOR VAR-NO-09]

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Srinivasan.		28.04.88	
CHD.	M.Masilamani.			
APPD.	J.Jude.		120988	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99003.	

TITLE: HOUSING. (SH-160)

CARD CODE: U 01

DRAWING No.: 3-80-999-99149

REV.: 04

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

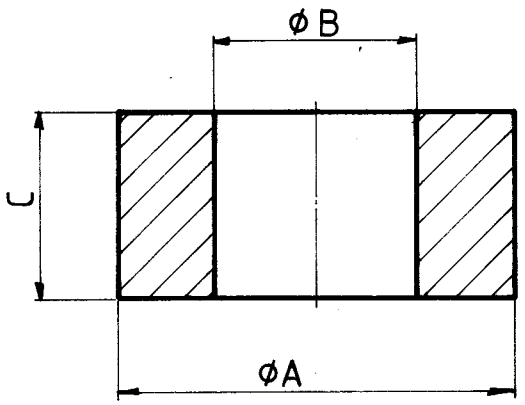
DRAWING NO. 3-80-999-99150

12.5

NOTES:-

01. MATERIAL EQUIVALENT:- SA 515 Gr 70. (OR) IS_961 Fe_540 WHT.

03 02. "IS 1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA-105".



VAR. NO.	ϕA	ϕB	C		REMARKS
01 to 04	33	14	16		
05 & 06	50	18	25		
07	50	22	25		
08 & 09	60	27	25		
10	76	33	36		
11	91	40	36		
12	109	52	56		
13	109	60	56		
14	174	72	85		
15	174	90	85		

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	QS
15		ROUND ϕ200. L=85.		3-80-999-99150		15-339-283 / SA-105	C		12,924	
14		ROUND ϕ200. L=85.				15-339-283 / SA-105	C		14,452	
13		ROUND ϕ125 L=56.				15-339-281 / SA-105	C		2,636	
12		ROUND ϕ125 L=56.				15-339-281 / SA-105	C		2,946	
11		ROUND ϕ100. L=36.				15-339-134 / SA-105	C		1,648	
10		ROUND ϕ80. L=36.				15-339-144 / SA-105	C		1,761	
09 & 08		ROUND ϕ63 L=25.				15-339-143 / SA-105	C		0,321	
07		ROUND ϕ50. L=25.				15-339-142 / SA-105	C		0,358	
06 & 05		ROUND ϕ50. L=25.				15-339-142 / SA-105	C		0,383	
04 to 01		ROUND ϕ36. L=16.				15-339-280 / SA-105	C		0,102	

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Seshagiri		08-04-88	15
CHD.	M.Masilamani		12/04/88	
APPD.	J.Jude		21/04/88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM		-

TITLE: PLATE-1 (For Turn Buckle)

CARD CODE: U 01

DRAWING No.: 3-80-999-99150

REV.: 03

SIZE A3

REV	DATE	ALTD: / APPD:
03	07.03.89	

NOTE-02 ADDED.

REV.	DATE	ALTERED / CHECKED
02	17/7/89	

DIM 'A' ALTERED AS FOLLOWS:

VAR-NO.	FROM	TO
08/09	50	60
10	91	76
12/13	109	109

CORRESPONDINGLY MATL CODE ALTERED. THIS IS DUE TO CHANGE IN BODY PIPE SIZE.

REV	DATE	ALTERED / CHECKED
01	20.07.88	

DIMENSION 'A' ALTERED. TOLERANCE 'Y5' DELETED.

MATL. IS 1875 CL.3 REPLACED BY SA 515 Gr. 70. IN NOTE-1. MATL. SIZE & CODE ALTD. FOR VAR. Nos. 01 TO 09, 12 & 13.

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

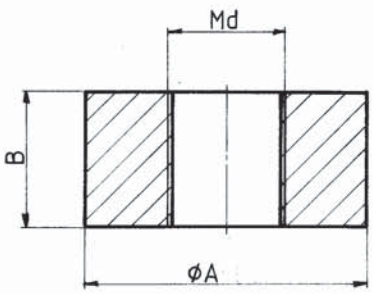
DRAWING No. 3-80-999-99151

12.5

NOTES:

01. MATL. EQUIVALENT:-SA 515 Gr 70. (OR) IS_961 Fe-540 WHT.

03 02. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".



VAR. NO.	ØA	B	Md		REMARKS
01 to 04	33	16	12×1,75		
05 & 06	50	25	16×2		
07	50	25	20×2,5		
08 & 09	60	25	24×3		
10	76	36	30×3,5		
11	91	36	36×4		
12	109	56	48×5		
13	109	56	56×4		
14	174	85	68×4		
15	174	85	85×4		

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	QS
15		ROUND Ø200. L=85		3-80-999-99151		15-339-283 / SA-105	C		13,382	
14		ROUND Ø200. L=85				15-339-283 / SA-105	C		14,745	
13		ROUND Ø125 L=56				15-339-281 / SA-105	C		2,797	
12		ROUND Ø125 L=56				15-339-281 / SA-105	C		3,084	
11		ROUND Ø100. L=36				15-339-134 / SA-105	C		1,715	
10		ROUND Ø 80. L=36				15-339-144 / SA-105	C		1,803	
09 & 08		ROUND Ø63. L=25				15-339-143 / SA-105	C		0,344	
07		ROUND Ø50. L=25				15-339-142 / SA-105	C		0,371	
06 & 05		ROUND Ø50. L=25				15-339-142 / SA-105	C		0,394	
04 to 01		ROUND Ø36. L=16				15-339-280 / SA-105	C		0,107	

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Seshagiri		11-04-88	15
CHD.	M.Masilamani		18-4-88	
APPD.	J.Jude		210688	

REV	DATE	APPD	REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED
03	01.03.89		02	17/7/89		01	20.07.88	

NOTE-02 ADDED.

DIM. 'A' ALTERED AS FOLLOWS

VAR. NO.	FROM	TO
08/09	50	60
10	91	76
12/13	100	109

CORRESPONDINGLY MATL CODE NO. CHANGED THIS IS DUE TO CHANGE IN BODY PIPE SIZE.

DIMENSION 'A' ALTERED. TOLERANCE IS DELETED.

MATL. IS 1875 CL.3 REPLACED BY SA 515 GR. 70 IN NOTE-1. MATL. SIZE & CODE RTD. FOR VAR. Nos. 01 TO 09, 12 & 13.

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY / OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM		—

TITLE: PLATE-2 (For Turn Buckle)

CARD CODE: U 01

DRAWING No.: 3-80-999-99151

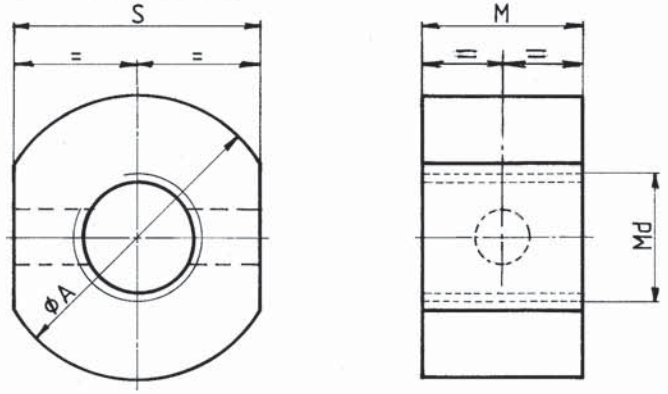
REV.: 03

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99152

12.5



VAR.NO.	ØA	Md	S	M	REMARKS
01 to 04	22	M12×1,75	19	12	
05&06	28	M16×2,0	24	16	
07	35	M20×2,5	30	20	
08&09	42	M24×3,0	36	24.	
10	53	M30×3,5	46	30	
11	63	M36×4,0	55	36	
12	80	M48×5,0	70	48	
13	92	M56×4,0	80	56	
14	110	M68×4,0	100	68	
15	127	M85×4,0	115	85	

NOTE:

01. MATL. EQUIVALENT: IS_1875 CL.3. (OR) IS_961 Fe_540 WHT (OR) BS 970 080 M40
02. THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
04 HOLE TO BE DRILLED AS INDICATED IN DOTTED LINES, AS PER SHOP NOTE-5 OF ASSY DRG.NO: 1-80_999_99002.
03 05. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105."

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
15		ROUND Ø165. L-85		3-80-999-99152		15-339-282 / SA-105	C		4,376	
14		ROUND Ø125. L-68				15-339-281 / SA-105	C		2,970	
13		ROUND Ø100. L-56				15-339-134 / SA-105	C		1,678	
12		ROUND Ø100. L-48				15-339-134 / SA-105	C		1,114	
11		ROUND Ø80. L-36				15-339-144 / SA-105	C		0,546	
10		ROUND Ø63. L-30				15-339-143 / SA-105	C		0,324	
09 & 08		ROUND Ø50. L-24				15-339-142 / SA-105	C		0,159	
07		ROUND Ø36. L-20				15-339-280 / SA-105	C		0,,092	
06 & 05		ROUND Ø32. L-16				15-339-140 / SA-105	C		0,,047	
04 to 01		ROUND Ø25. L-12				15-339-139 / SA-105	C		0,,023	

REV	DATE	ALTERED / CHECKED
02	01/11/99	
01	22/7/88	

IN NOTE No- 01 MATL: BS 970 EN8 changed to BS 970 080 M40

REV	DATE	ALTERED: / APPROVED:
03	07-03-07	

NOTE 05 ADDED

IN NOTE 1, MATL. BS 970 EN8 IS ADDED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	R.Seshagiri		19-4-88
CHD.	M.Masilamani		19/4/88
APPD.	J.Jude		210688

No. OF VAR. 15

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002 & 1-80-999-99003.	16

TITLE: NUT

CARD CODE: U 01

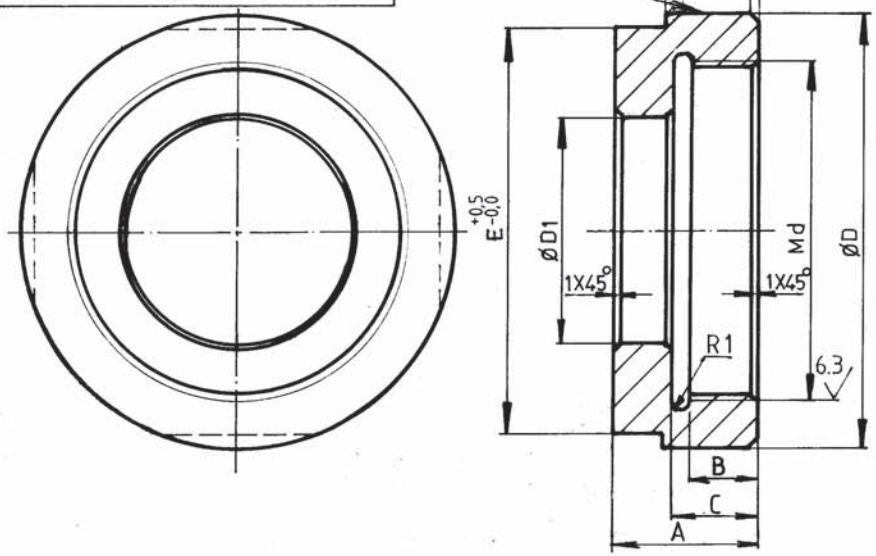
DRAWING No.: 3-80-999-99152

REV.: 03

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99153



NOTES:

01. MATL. EQUIVALENT: IS-1875 CL.3. (OR) IS-961 Fe-540 WHT (OR) BS: 970 080 M40 (03)
02. THIS COMPONENT SHALL BE ELECTRO GALVANISED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
04. 04. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105."

VAR NO	ØD	ØD1	Md	A	B	C	E	F	G	REMARKS
01 to 04	30	14	M24×1,5	27	20	22	27	22	2	
05&06	36	18	M30×1,5	32	25	27	32	27	2	
07	44	23	M36×1,5	42	34	36	41	36	2	
08&09	50	27	M42×1,5	46	36	38	46	40	2	
10	60	33	M50×1,5	59	47	49	55	51	3	
11	70	39	M58×1,5	73	59	61	60	63	3	
12	90	51	M75×2 (02)	94	80	82	80	84	3	
13	110	59	M90×2	114	96	98	100	102	3	
14	130	71	M105×2	144	126	128	115	132	3	
15	155	88	M125×2	178	156	158	145	162	3	

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
15		ROUND ϕ165. L-178.		3-80-999-99153		15-339-282 / SA-105	C		10|190	
14		ROUND ϕ165. L-144.				15-339-282 / SA-105	C		5|810	
13		ROUND ϕ125. L-114.				15-339-281 / SA-105	C		3|270	
12		ROUND ϕ100. L- 94.				15-339-134 / SA-105	C		1|660	
11		ROUND ϕ 80. L- 73.				15-339-144 / SA-105	C		0|830	
10		ROUND ϕ 63. L- 59.				15-339-143 / SA-105	C		0|490	
09 & 08		ROUND ϕ 50. L- 46.				15-339-142 / SA-105	C		0|260	
07		ROUND ϕ50. L- 42.				15-339-142 / SA-105	C		0|190	
06 & 05		ROUND ϕ36. L- 32.				15-339-280 / SA-105	C		0|100	
04 to 01		ROUND ϕ 32. L- 27.				15-339-140 / SA-105	C		0|070	

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Srinivasan.	R.Srini	20-4-88	15
CHD.	M.Masilamani.		18/4/88	
APPD.	J.Jude.	Jude	21.06.88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1.80_999_99002 & 1.80_999_99003	07

TITLE: HYDRAULIC LOCK NUT

CARD CODE: U 01

DRAWING No.: 3-80-999-99153

REV.: 0

SIZE A3

REV	DATE	ALTERED: / APPROVED:
03	01/11/99	

In Note No:-01 MATL BS:970EN8 changed to BS 970 080 M40

REV	DATE	ALTERED: / APPROVED:
04	07-03-07	

NOTE-04 ADDED.

REV.	DATE	ALTERED: / APPROVED:
02	7/6/94	

FOR VAR 12, THREAD SIZE ALTD FROM M75X1·5 TO M75X2.

REV	DATE	ALTERED / CHECKED
01	22/7/88	

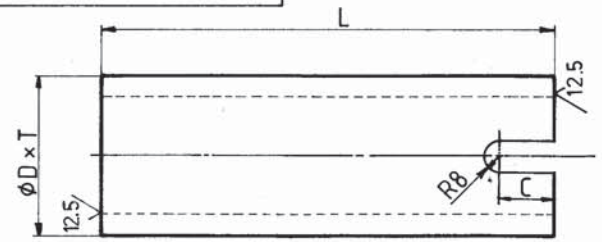
IN NOTE 1, MATL. BS 970EN 8 IS ADDED. NOTE-4 IS DELETED. TITLE CHANGED FROM SLEEVE NUT TO HYDRAULIC LOCK NUT.

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99154

12.5



NOTES:

01. MACHINING ON OD IS APPLICABLE FOR VAR.NO.12 ONLY.

02 IS:1239 PIPES IN PLACE OF SA.- 192 IS ACCEPTABLE SUBJECT TO THE CONDITION OF MAINTAINING ØD

03. "IS:3589 FE330" IS ALSO ACCEPTABLE IN PLACE OF "API5LGRB".

VAR.NO.	ØD x T	L	C	REMARKS.
01	ø63,5 x 3,2	55	20	
02	ø89,5x4,85	50	20	
03	ø51,0 x 4,0	112	20	
04	ø63,5 x 3,2	128	20	
05	ø76,0 x 3,25	133	25	
06	ø 76,0 x 3,25	127	25	
07	ø 113,9x3,65	145	30	
08	ø 89,5x4,85	230	35	
09	ø 108,0x8,0	283	40	
10	ø113,9x3,65	303	45	
11	ø166,5x4,85	274	55	
12	ø210,0x9,65	310	70	
13	ø 219,1x6,35	398	70	
14	ø140,8x4,85	733	70	
15	ø166,5x4,85	882	70	

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A C	UNIT	UNIT. WT. / QTY.	QS
15		PIPE ø166,5x4,85. L-~~890~~ 882		3-80-999-99154		15-038-085 / IS-1239	C		17,088	
14		PIPE ø140,8x4,85 L-~~741~~ 733				15-038-084 / IS 1239	C		12,000	
13		PIPE ø219,1x6,35. L-~~406~~ 398				15-938-194 / API 5L Gr.B	C		13,512	
12		PIPE ø219,1x14,2 . L-~~318~~ 310				15-082-215 / SA 106 Gr B	C		15,162	
11		PIPE ø166,5x4,85. L-~~282~~ 274				15-038-085 / IS1239	C		5,415	
10		PIPE ø113,9x3,65. L-~~311~~ 303				15-038-089 / IS1239	C		3,075	
09		PIPE ø108,0x8,0. L-~~291~~ 283 (02)				15-082-164 / SA 106 Gr B	C		(02) 5,740	
08		PIPE ø 89,5x4,85. L-~~238~~ 230				15-038-073 / IS-1239	C		2,404	
07		PIPE ø113,9x3,65. L-~~153~~ 145				15-038-089 / IS1239	C		1,513	
06		PIPE ø76,0x3,25. (04) 127 L-~~155~~				15-038-058 / IS-1239	C		0,900	
05		PIPE ø 76,0x3,25. L-~~161~~ (04) 133				15-038-058 / IS-1239	C		0,934	
04		PIPE ø63,5x3,2. L-~~156~~ (04) 128				15-084-111 / SA 192	C		0,842	
03		PIPE ø51,0x4,0. L-~~140~~ (04) 112				15-084-104 / SA192	C		0,732	
02		PIPE ø89,5x4,85. L-~~68~~ (04) 50				15-038-073 / IS 1239	C		0,687	
01		PIPE ø63,5x3,2. L-~~73~~ (04) 55 (03) FOR ALL VARIANTS				15-084-111 / SA 192	C		0,394	

REV	DATE	ALTERED / CHECKED
04	25/02/2000	MID / APPD

HEIGHT OF INNER GUIDE PIPE (DIM'L') REDUCED BY 10mm FOR VAR-01 & 02 AND BY 20mm FOR VAR 03 TO 06, AS PER SHOP FEED BACK.

REV	DATE	ALTD. / APPD.
05	15/03/01	

NOTE-03 ADDED

REV	DATE	ALTERED / CHECKED
03	20-6-99	ER (SJK)

DIMENSION 'L' REDUCED BY 8mm FOR ALL VARIANTS AS PER SHOP FEEDBACK.

REV	DATE	ALTERED / CHECKED
02	19.6.89	R. SRINIVASAN / RA

ZONE

FOR VAR.NO.09 'L' DIMESION REVISED. FROM 263 TO 291; WEIGHT REVISED FROM 5.155 TO 5.740 kg. NOTE-2 ALTERED.

REV	DATE	ALTERED / CHECKED
01	21.07.88	/

DIMENSION 'C' ADDED. SLOTS TO BE CUT AS REQUIRED. ø Dxt, MATERIAL CODE & WEIGHT ALTERED FOR VAR Nos: 01 TO 04, 06 TO 12, AND 14.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Seshagiri	R. Seshagiri	21-4-'88	15
CHD.	M.Masilamani	M. Masilamani	18/6/88	
APPD.	J.Jude	J. Jude	210688	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002.	14

TITLE	CARD CODE	DRAWING No.	REV.
INNER GUIDE PIPE	U 01	3-80-999-99154	05

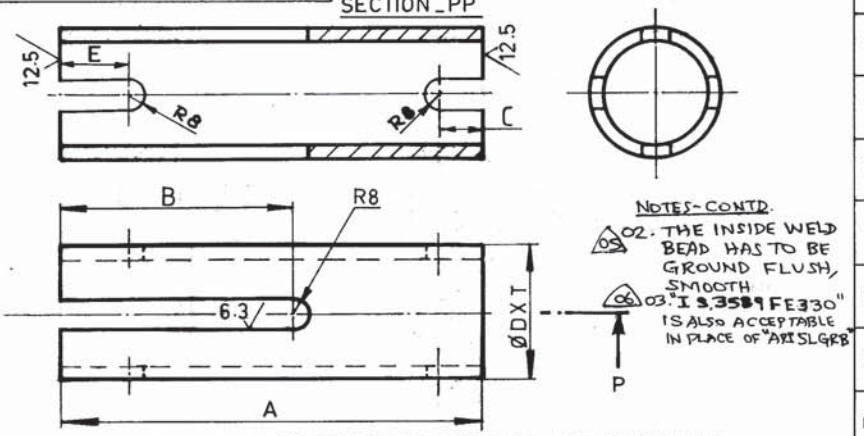
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99157

6.3 12.5

SECTION _ PP



NOTES-CONTD.

02. THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH, SMOOTH

03. "I 3.3589 FE330" IS ALSO ACCEPTABLE IN PLACE OF "API 5LGRB"

NOTES: 01. FOR VAR. NOS. 11 TO 15. THICKNESS OF PIPES 6.35mm IS ACCEPTABLE.

VAR.NO	ØD X T	A	B 04	C	E		REMARKS
01	113.9 X 3.65	219	~~145~~ 155	30	5		
02	166.5 X 4.85	216	~~145~~ 155	30	6		
03	113.9 X 3.65	286	~~145~~ 155	30	5		
04	113.9 X 3.65	303	~~145~~ 155	30	5		
05	166.5 x 4.85	310	~~145~~ 155	35	6		
06	166.5X 4.85	310	~~150~~ 160	35	6		
07	219.1X 6.35	314	~~150~~ 160	40	7		
08	166.5X 4.85	403	~~150~~ 160	45	6		
09	219.1X 6.35	466 03	~~150~~ 160	55	7		
10	219.1X 6.35	494	~~160~~ 170	60	7		
11	323.9X 7.92	469	~~160~~ 170	70	9		
12	355.6X7.92	517	~~160~~ 170	90	9		
13	406.4X9.53	619	~~170~~ 180	90	11		
14	323.9X7.92						
15	355.6 X 7.92						

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
	15	PIPE Ø355.6X7.92.		3-80-999-99157.		15-938-217 / API-5L GR.B	C			
	14	PIPE Ø323.9X7.92.				15-938-199 / API-5L GR.B	C			
	13	PIPE Ø406.4X9.53				15-938-172 / API-5L GR.B	C		57 | 025	
	12	PIPE Ø355.6X7.92				15-938-217 / API-5L GR.B	C		34 | 648	
	11	PIPE Ø323.9X7.92				15-938-199 / API-5L GR.B	C		28 | 517	
	10	PIPE Ø219.1X6.35				15-938-194 / API-5L-GR B	C		16 | 089	
	09	PIPE Ø219.1X6.35				15-938-194 / API-5L-GR B	C		03 15 | 175	
	08	PIPE Ø166.5X4.85				15-038-085 / IS-1239	C		7 | 500	
	07	PIPE Ø219.1X6.35				15-938-194 / API-5L GR.B	C		10 | 147	
	06	PIPE Ø166.5X4.85				15-038-085 / IS-1239	C		5 | 733	
	05	PIPE Ø166.5×4.85				15-038-085 / IS-1239	C		5 | 733	
	04	PIPE Ø113.9X3.65				15-038-089 / IS-1239	C		2 | 836	
	03	PIPE Ø113.9X3.65				15-038-089 / IS-1239	C		2 | 668	
	02	PIPE Ø166.5X4.85				15-038-085 / IS-1239	C		3 | 934	
	01	PIPE Ø113.9X3.65				15-038-089 / IS-1239	C		2 | 006	

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.Srinivasan	R. Srinivasan	27 04 88	
CHD.	M.Masilamani		08/6/88	
APPD.	J.Jude.	Jude.	210688	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
PC	C/M/F	NTS	AS PER BOM	1-80-999-99002.	01

TITLE: HOUSING (SH-80)

CARD CODE: U 01

DRAWING No.: 3-80-999-99157.

REV.: 06

SIZE A3

REV	DATE	ALTD/CHKD
06	10/2/2000	APPD

DIMENSION 'B' FOR SLOTS INCREASED BY 10MM FOR VARIANTS 01 TO 13 AS PER SHOP FEED BACK.

REV	DATE	ALTD:
05	1/9/2000	APPD:

NOTE-02 ADDED.

REV	DATE	ALTD/CHKD
03	19/6/99	CHKD

FOR VAR. NO. 09 - DIMENSION 'A' ALTERED FROM 438 TO 466; WEIGHT ALTERED FROM 14.242 TO 15.175 Kg.

REV	DATE	ALTERED: / CHECKED:
02	24.8.88	

DIMENSIONS A, B, C, AND WEIGHT ALTERED. DIMENSION 'E' ADDED.

REV	DATE	ALTERED
01	09.07.88	CHECKED

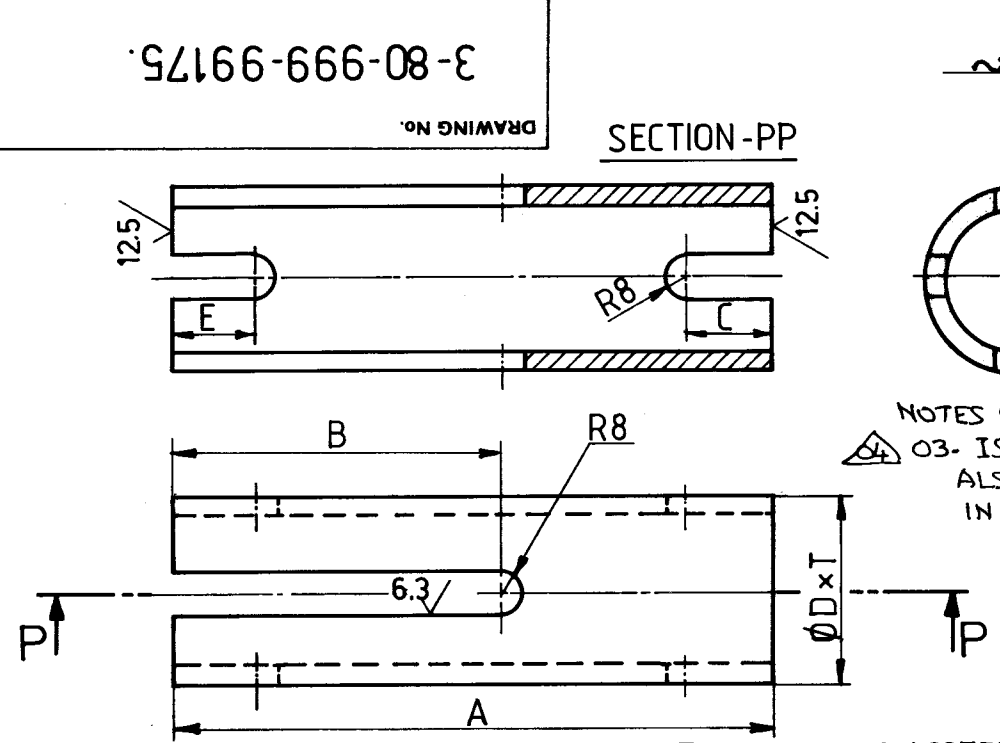
DIMENSION 'B' ALTERED FOR ALL VARIANTS.

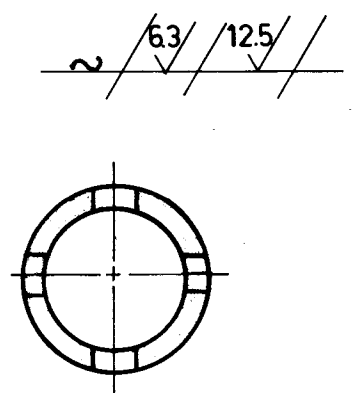
REV	DATE	ALTERED: / APPROVED:
06	07-03-07	

NOTE-03 ADDED.

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99175





NOTES CONTD.
04 03- IS,3589 FE330 IS ALSO ACCEPTABLE IN PLACE OF "API5LGRB".

NOTES: 01-FOR VAR.NOS.11 TO 15. THICKNESS OF PIPES 6.35 mm.IS ACCEPTABLE.
03 02-THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH, SMOOTH

VAR. NO.	A	B 02	C	E	REMARKS
01	204	~~145~~ 155	30	5	
02	201	~~145~~ 155	30	6	
03	271	~~145~~ 155	30	5	
04	288	~~145~~ 155	30	5	
05	298	~~145~~ 155	35	6	
06	298	~~150~~ 160	35	6	
07	305	~~150~~ 160	40	7	
08	397	~~150~~ 160	45	6	
09	460 01	~~150~~ 160	55	7	
10	493	~~180~~ 190	60	7	
11	473	~~180~~ 190	70	9	
12	530	~~180~~ 190	90	9	
13	639	~~200~~ 210	90	11	
14					
15					

VARIANT No.	ITEM No.	DESCRIPTION (ØD×T)	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
15		PIPE Ø355,6×7,92.		3-80-999-99175		15-938-217 / API 5L GRB	C		1 /	
14		PIPE Ø323,9×7,92.				15-938-199 / API 5L GRB	C		1 /	
13		PIPE Ø406,4×9,53.				15-938-172 / API 5L GRB	C		58,890 /	
12		PIPE Ø355,6×7,92.				15-938-217 / API 5L GRB	C		35,530 /	
11		PIPE Ø323,9×7,92.				15-938-199 / API 5L GRB	C		28,760 /	
10		PIPE Ø219,1×6,35.				15-938-194 / API 5L GRB	C		16,060 /	
09		PIPE Ø219,1×6,35.				15-938-194 / API 5L GRB	C		03 14,973 /	
08		PIPE Ø166,5×4,85.				15-038-085 / IS 1239	C		7,380 /	
07		PIPE Ø219,1×6,35.				15-938-194 / API 5L GRB	C		9,850 /	
06		PIPE Ø166,5×4,85.				15-038-085 / IS1239	C		5,500 /	
05		PIPE Ø166,5×4,85.				15-038-085 / IS 1239	C		5,500 /	
04		PIPE Ø113,9×3,65.				15-038-089 / IS1239	C		2,690 /	
03		PIPE Ø113,9×3,65.				15-038-089 / IS1239	C		2,520 /	
02		PIPE Ø166,5×4,85.				15-038-085 / IS 1239	C		3,650 /	
01		PIPE Ø113,9×3,65.				15-038-089 / IS1239	C		1,860 /	

REV	DATE	ALTD	APPD	NOTE
03	11/9/2000	RA	VJ	NOTE 02 ADDED.
04	07/3/01	RA		NOTE 03 ADDED

REV	DATE	ALTD	APPD	NOTE
02	10/2/2000	RA	VJ	DIMENSION 'B' FOR SLOTS INCREASED BY 10mm FOR VARIANTS 01 TO 13 AS PER SHOP FEED BACK.

REV	DATE	ALTERED / CHECKED	NOTE
01	19/6/89	RA	FOR VAR NO. 09 - DIMENSION 'A' ALTERED FROM 432 TO 460; WEIGHT ALTERED FROM 14.040 TO 14.973 kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL.		19.09.88	
CHD.	M.M.MANI.		14x88	
APPD.	J. JUDE.			

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: HOUSING. (SA-80)

CARD CODE: U 01

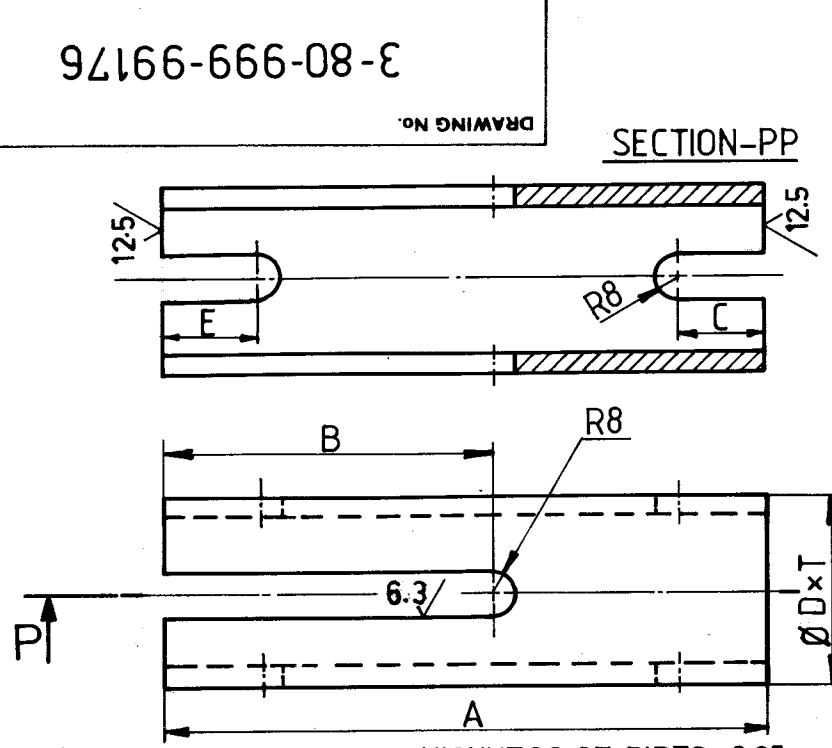
DRAWING No.: 3-80-999-99175

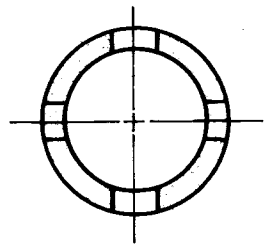
REV.: 04

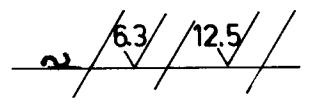
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99176







NOTES CONTD:
04 03. IS:3589 FE330 IS ALSO ACCEPTABLE IN PLACE OF "API5LGRB".

NOTES: 01. FOR VAR. NOS. 11 TO 15. THICKNESS OF PIPES 6.35 mm. IS ACCEPTABLE.
03 02. THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH, SMOOTH.

VAR. NO.	A	B 02	C	E					REMARKS.
01	378	~~245~~ 265	30	5					
02	370	~~245~~ 265	30	6					
03	512	~~245~~ 265	30	5					
04	546	~~245~~ 265	30	5					
05	561	~~245~~ 265	35	6					
06	557	~~250~~ 270	35	6					
07	564	~~250~~ 270	40	7					
08	743	~~250~~ 270	45	6					
09	863 01	~~250~~ 270	55	7					
10	916	~~280~~ 300	60	7					
11	867	~~280~~ 300	70	9					
12	964	~~280~~ 300	90	9					
13	1166	~~300~~ 320	90	11					
14									
15									

VARIANT No.	ITEM No.	(Ø D × T) DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT WT. / QTY.	GS
15		PIPE Ø355,6 × 7,92		3-80-999-99176		15-938-217 / API 5L GR B	C		1	
14		PIPE Ø323,9 × 7,92				15-938-199 / API 5L GR B	C		1	
13		PIPE Ø406,4 × 9,53				15-938-172 / API 5L GR B	C		107,970	
12		PIPE Ø355,6 × 7,92				15-938-217 / API 5L GR B	C		65,030	
11		PIPE Ø323,9 × 7,92				15-938-199 / API 5L GR B	C		53,110	
10		PIPE Ø219,1 × 6,35				15-938-194 / API 5L GR B	C		30,150	
09		PIPE Ø219,1 × 6,35				15-938-194 / API 5L GR B	C		01 28,385	
08		PIPE Ø166,5 × 4,85				15-038-085 / IS 1239	C		14,030	
07		PIPE Ø219,1 × 6,35				15-938-194 / API 5L GR B	C		18,470	
06		PIPE Ø166,5 × 4,85				15-038-085 / IS1239	C		10,470	
05		PIPE Ø166,5 × 4,85				15-038-085 / IS1239	C		10,550	
04		PIPE Ø113,9 × 3,65				15-038-089 / IS1239	C		5,240	
03		PIPE Ø113,9 × 3,65				15-038-089 / IS1239	C		4,900	
02		PIPE Ø166,5 × 4,85				15-038-085 / IS1239	C		6,890	
01		PIPE Ø113,9 × 3,65				15-038-089 / IS1239	C		3,580	

REV	DATE	ALTD.	APPD.
03	11/9/2009		
02	10/2/2009	ALTD	APPD
01	19/6/89	ALTERED	CHECKED
04	07/03/07	ALTD:	APPD:

NOTE 02 ADDED.

DIMENSION 'B' FOR SLOTS INCREASED BY 20 MM FOR VARIANTS 01 TO 13 AS PER SHOP FEEDBACK.

FOR VAR NO. 09 - DIMENSION 'A' ALTERED FROM 807 TO 863; WEIGHT ALTERED FROM 26·520 TO 28·385 kg.

NOTE 03 ADDED

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	P.S VEL		20.09.88
CHD.	M.M.MANI.		16/10
APPD.	J. JUDE.		14x88

No. OF VAR.

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: HOUSING. (SA-160)

CARD CODE: U 01

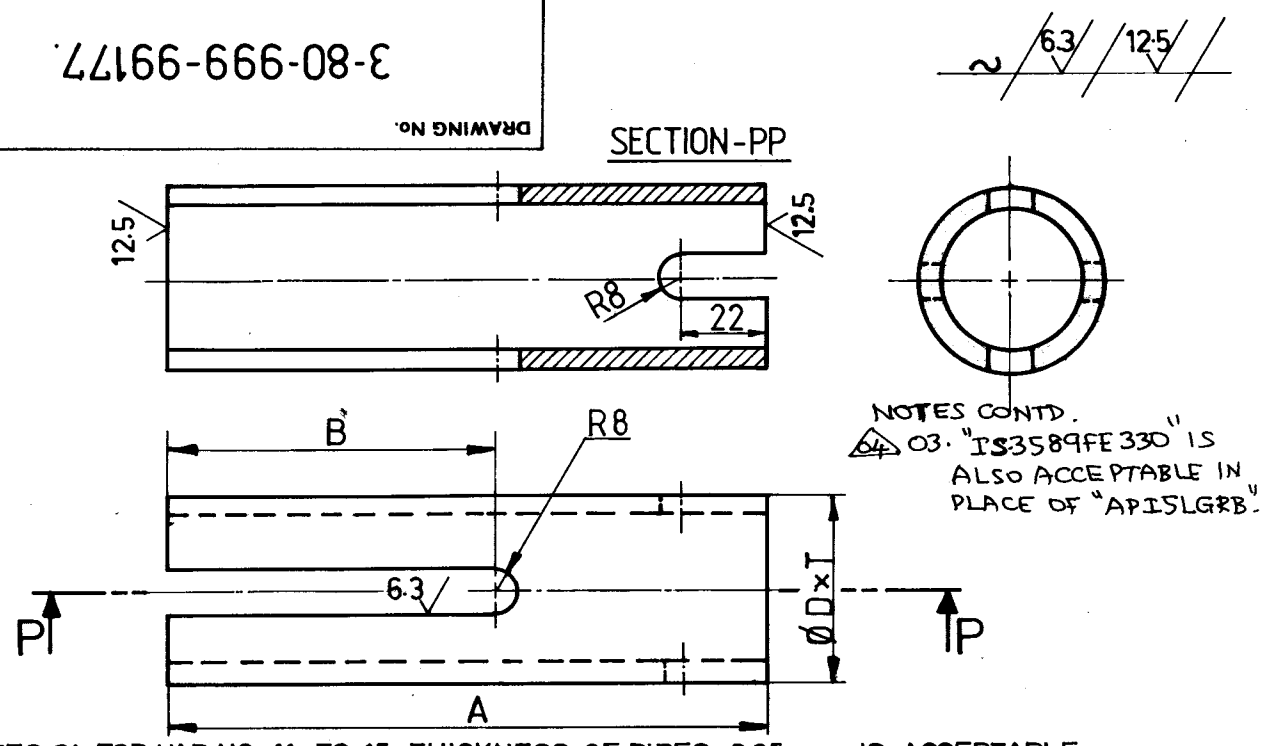
DRAWING No.: 3-80-999-99176.

REV.: 04

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99177



NOTES CONTD.
04 03. "IS3589FE330" IS ALSO ACCEPTABLE IN PLACE OF "APISLGRB".

NOTES: 01. FOR VAR.NO. 11 TO 15. THICKNESS OF PIPES 6.35 mm. IS ACCEPTABLE.
03 02. THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH, SMOOTH

VAR. NO.	A	B 04							REMARKS
01	199	~~145~~ 155							
02	194	~~145~~ 155							
03	266	~~145~~ 155							
04	283	~~146~~ 156							
05	288	~~146~~ 156							
06	284	~~148~~ 158							
07	284	~~150~~ 160							
08	371	~~152~~ 162							
09	428 01	~~156~~ 166							
10	448	~~156~~ 166							
11	419	~~156~~ 166							
12	459	~~160~~ 170							
13	552	~~165~~ 175							
14	892	~~170~~ 180							
15	1047	~~176~~ 186							

VARIANT No.	ITEM No.	(ØD × T) DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	QS
15		PIPE Ø355,6× 7,92		3-80-999-99177.		15-938-217 / API 5L GR B	C		70,689	
14		PIPE Ø323,9×7,92				15-938-199 / API 5L GRB	C		54,654	
13		PIPE Ø406,4×9,53				15-938-172 / API 5L GRB	C		51,021	
12		PIPE Ø355,6×7,92				15-938-217 / API 5L GRB	C		30,794	
11		PIPE Ø323,9×7,92				15-938-199 / API 5L GRB	C		25,491	
10		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		14,631	
09		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		61 13,965	
08		PIPE Ø166,5×4,85				15-038-085 / IS1239	C		6,953	
07		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		9,177	
06		PIPE Ø166,5×4,85				15-038-085 / IS1239	C		5,276	
05		PIPE Ø166,5×4,85				15-038-085 / IS1239	C		5,356	
04		PIPE Ø113,9×3,65				15-038-089 / IS1239	C		2,648	
03		PIPE Ø113,9×3,65				15-038-089 / IS 1239	C		2,480	
02		PIPE Ø166,5×4,85				15-038-085 / IS1239	C		3,539	
01		PIPE Ø113,9×3,65				15-038-089 / IS 1239	C		1,816	

REV	DATE	ALTD	APPD
03	11/9/2000		
NOTE 02 ADDED			
04	07/03/01	ALTD:	APPD:
NOTE 03 ADDED			

REV	DATE	ALTD	APPD
02	10/2/2000		

DIMENSION B FOR SLOT INCREASED BY 10 MM FOR ALL VARIANTS AS PER SHOP FEEDBACK.

REV	DATE	ALTERED / CHECKED
01	19/6/89	

FOR VAR. NO. 09 - DIMENSION 'A' ALTERED FROM 400 TO 428; WEIGHT ALTERED FROM 13.032 TO 13.965 Kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL.		17.09.88	
CHD.	M.M.MANI		26/11	
APPD.	J. JUDE		26/11/88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: HOUSING. (SS-80)

CARD CODE: U 01

DRAWING No.: 3-80-999-99177.

REV.: 04

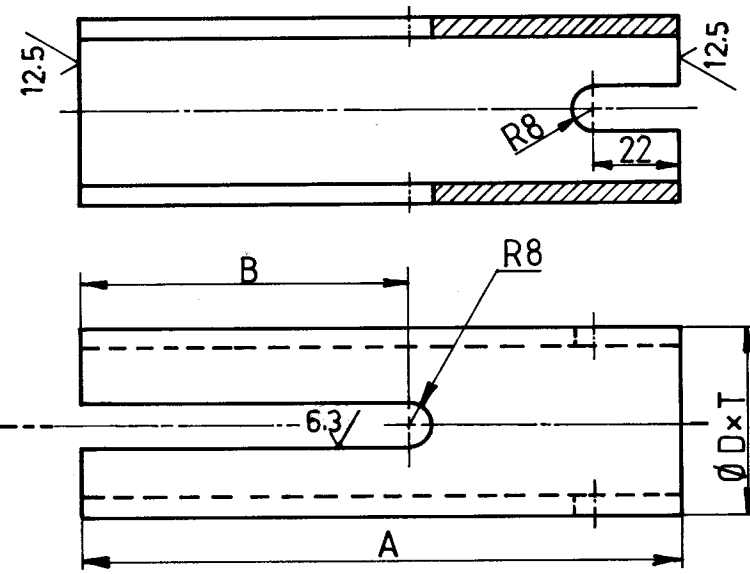
SIZE A3

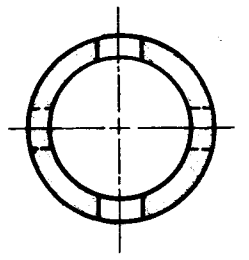
FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99178.

SECTION-PP





6.3 12.5

NOTES CONTD.
04 03. "IS.3589 FE 330" IS ALSO ACCEPTABLE IN PLACE OF "API5LGRB."

NOTES 01. FOR VAR. NOS. 11 TO 15. THICKNESS OF PIPES 6.35mm. IS ACCEPTABLE.
03 02. THE INSIDE WELD BEAD HAS TO BE GROUND FLUSH/SMOOTH

VAR. NO.	A	B 02							REMARKS
01	373	~~240~~ 260							
02	363	~~240~~ 260							
03	507	~~240~~ 260							
04	541	~~242~~ 262							
05	551	~~242~~ 262							
06	543	~~246~~ 266							
07	543	~~250~~ 270							
08	717	~~256~~ 274							
09	831 01	~~262~~ 282							
10	871	~~262~~ 282							
11	813	~~262~~ 282							
12	893	~~270~~ 280							
13	1079	~~280~~ 300							
14	1759	~~290~~ 310							
15	2069	~~302~~ 312							

VARIANT No.	ITEM No.	(ØD×T) DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
15		PIPE Ø355,6×7,92		3-80-999-99178.		15-938-217 / API 5L GR B	C		139,837	
14		PIPE Ø323,9×7,92				15-938-199 / API 5L GR B	C		107,920	
13		PIPE Ø406,4×9,53				15-938-172 / API 5L GRB	C		99,898	
12		PIPE Ø355,6×7,92				15-938-217 / API 5L GRB	C		60,045	
11		PIPE Ø323,9×7,92				15-938-199 / API 5L GRB	C		49,595	
10		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		28,554	
09		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		01 27,221	
08		PIPE Ø166,5×4,85				15-038-085 / IS 1239	C		13,518	
07		PIPE Ø219,1×6,35				15-938-194 / API 5L GRB	C		17,646	
06		PIPE Ø166,5×4,85				15-038-085 / IS 1239	C		10,164	
05		PIPE Ø166,5×4,85				15-038-085 / IS 1239	C		10,323	
04		PIPE Ø113,9×3,65				15-038-089 / IS 1239	C		5,121	
03		PIPE Ø113,9×3,65				15-038-089 / IS 1239	C		4,785	
02		PIPE Ø166,5×4,85				15-038-085 / IS 1239	C		6,691	
01		PIPE Ø113,9×3,65				15-038-089 / IS 1239	C		3,455	

REV	DATE	ALTD: / APPD:	REMARKS
03	11/9/2000	ALTD: / APPD:	NOTE 02 ADDED.
04	6/10/2000	ALTD: / APPD:	NOTE 03 ADDED

REV	DATE	ALTD / APPD	REMARKS
02	10/2/2000	ALTD / APPD	DIMENSION 'B' FOR SLOTS INCREASED BY 20MM FOR ALL VARIANTS AS PER SHOP FEEDBACK.

REV	DATE	ALTERED / CHECKED	REMARKS
01	19/6/89	ALTERED / CHECKED	FOR VAR. NO. 09 - DIMENSION 'A' ALTERED FROM 775 TO 831; WEIGHT ALTERED FROM 25.356 TO 27.221 kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL.		16.09.88	
CHD.	M.M.MANI.	-- Sd --		
APPD.	J.JUDE		14x88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: HOUSING. (SS-160)

CARD CODE: U 01

DRAWING No.: 3-80-999-99178.

REV.: 04

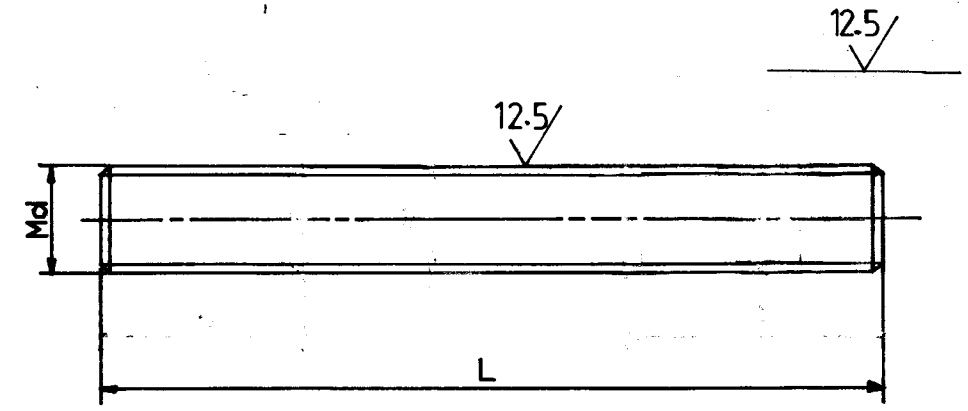
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99181

VAR NO.	Md	A ROD DIA	B	C	L		MATL CODE	WEIGHT (Kg).	REMARKS
01	M12x1.75	12	130	35	191		15-004-030	0.170	
02	M12x1.75	12	130	35	191		15-004-030	0.170	
03	M12x1.75	12	130	35	191		15-004-030	0.170	
04	M12x1.75	12	130	35	192		15-004-030	0.170	
05	M16x2.00	16	140	45	217		15-004-106	0.342	
06	M16x2.00	16	140	45	219		15-004-106	0.346	
07	M20x2.50	22	150	55	249		15-339-343	0.615	
08	M24x3.00	25	160	65	272		15-339-139	0.970	
09	M24x3.00	25	160	70	276		15-339-139	0.980	
10	M30x3.50	32	170	80	316		15-339-140	1.750	
11	M36x4.00	36	185	95	355		15-339-280	2.840	
12	M48x5.00	48	210	120	425		15-339-142	6.040	
13	M56x4.00	56	230	145	479		15-339-143	9.260	
14	M68x4.00	68	255	175	571		15-339-144	16.280	
15	M85x4.00	85	290	210	672		15-339-134	29.930	



MATERIAL:

VAR. NO. 01 TO 06 - ~~BMC 20~~ IS 2062 Fe410WA. (02)

07 TO 15 - SA105

NOTES:

01. MATL. EQUIVALENT: IS 1875 CL.3 (OR) IS 961 Fe 540 WHT (OR) BS 970 080 M40. (02)

02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µM. AND THREDED PORTIONS SHALL BE YELLOW CHROMATISED.

(03) 03. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS

REV	DATE	ALTD:	APPD:	NOTE
03	07/03/97			NOTE-03 ADDED.

REV	DATE	ALTERED / APPROVED	NOTE
02	15-11-1997		MATL FOR VAR-NOS 01 TO 06 ALTERED FROM BMC20 TO IS 2062 Fe410WA. • IN NOTE NO-01, MATL BS970 -EN 8 CHANGED TO BS970 080-M40.

REV	DATE	ALTERED / CHECKED	NOTE
01	3/3/98		TOP TIE ROD IS CHANGED AS FULLY THREADED. DIM. 'B' & 'C' REMOVED. DIM 'A' CHANGED AS ROD DIA.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	R. ANANTH.		14/1/98
CHD.	M.M.MANI		16/1/98
APPD.	J.JUDE.		14X88

No. OF VAR.:

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: TOP TIE ROD (TYPE: SA-80)

CARD CODE: U 01

DRAWING No.: 3-80-999-99181.

REV.: 03

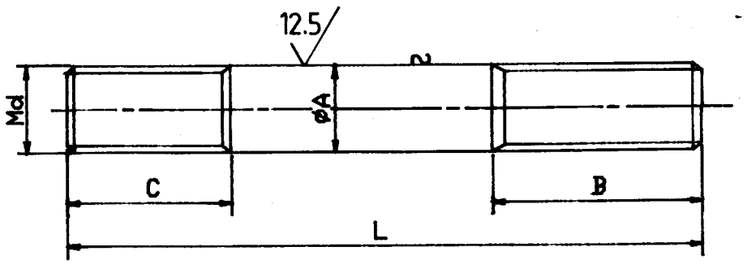
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING NO. 3-80-999-99186

VAR NO.	Md	A	B	C	L		MATL CODE	WEIGHT (Kg).	REMARKS
01	M12x1.75	12	140	35	321		15-004-030	0.285	
02	M12x1.75	12	140	35	316		15-004-030	0.280	
03	M12x1.75	12	140	35	438		15-004-030	0.388	
04	M12x1.75	12	140	35	454		15-004-030	0.403	
05	M16x2.00	16	160	45	518		15-004-106	0.818	
06	M16x2.00	16	160	45	515		15-004-106	0.813	
07	M20x2.50	22	170	55	515		15-339-343	1.270	
08	M24x3.00	25	180	65	654		15-339-139	2.320	
09	M24x3.00	25	180	70	709 (01)		15-339-139	2.528 (01)	
10	M30x3.50	32	200	80	805		15-339-140	4.470	
11	M36x4.00	36	210	95	776		15-339-280	6.200	
12	M48x5.00	48	260	120	844		15-339-142	12.000	
13	M56x4.00	56	270	145	990		15-339-143	19.140	
14	M68x4.00	68	320	175	1367		15-339-144	39.000	
15	M85x4.00	85	396	210	1526		15-339-134	68.000	

12.5



MATERIAL:
FOR VAR.NO. 01 TO 06 - ~~IS 226~~ IS 2062 Fe 410 WA. (02)
FOR VAR.NO. 07 TO 15 - SA105

NOTES:
01. MATL.EQUIVALENT: IS 1875 CL.3 (OR) IS 961 Fe540 WHT (OR) BS 970 ~~080~~ M40. (02)
02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µM. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
(03) 03. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105."

REV	DATE	ALTD:	APPD:	NOTE
03	21/10/91			NOTE 03 ADDED.

REV	DATE	ALTERED	APPROVED	NOTE
02	15-11-1999			FOR VAR.NO. 01 TO 06 MATL ALTD FROM IS 226 TO IS 2062 Fe410-WA. IN NOTE NO. 01 MATL BS 970 EN 8 CHANGED TO BS 970 080 M40.

REV	DATE	ALTERED	CHECKED	NOTE
01	19/6/89			FOR VAR NO. 09 DIMENSION 'L' ALTERED FROM 681 TO 709; WEIGHT ALTERED FROM 2.420 TO 2.528 Kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER /PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
PIPING CENTRE
MADRAS 600 017

	NAME	SIGN.	DATE	No. OF VAR.
DRN	P.S.VEL.		11.10.88	
CHD.	M.M.MANI.		14/10/88	
APPD.	J. JUDE.		14X88	

DEPT.	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (Kg)	REF. TO ASSY./OLD DRG.	ITEM No.
CODE	C/M/F	NTS.			

TITLE: BOTTOM TIE ROD (TYPE: SA 80)

CARD CODE U 01

DRAWING No. 3-80-999-99186.

REV. 03

DRAWING No. 3-80-999-99188

VAR NO.	A	D	Md		MATL CODE	WEIGHT (Kg).	REMARKS
01	25	22	M12x1.75		15-339-343	0.056	
02	25	22	M12x1.75		15-339-343	0.056	
03	25	22	M12x1.75		15-339-343	0.056	
04	25	22	M12x1.75		15-339-343	0.056	
05	33	25	M16x2.00		15-339-139	0.085	
06	33	25	M16x2.00		15-339-139	0.085	
07	41	32	M20x2.50		15-339-140	0.177	
08	45	36	M24x3.00		15-339-280	0.230	
09	45	36	M24x3.00		15-339-280	0.230	
10	57	50	M30x3.50		15-339-142	0.620	
11	69	63	M36x4.00		15-339-143	1.230	
12	89	80	M48x5.00		15-339-144	2.450	
13	105	100	M56x4.00		15-339-134	4.650	
14	131	100	M68x4.00		15-339-134	4.660	
15	165	125	M85x4.00		15-339-281	9.050	

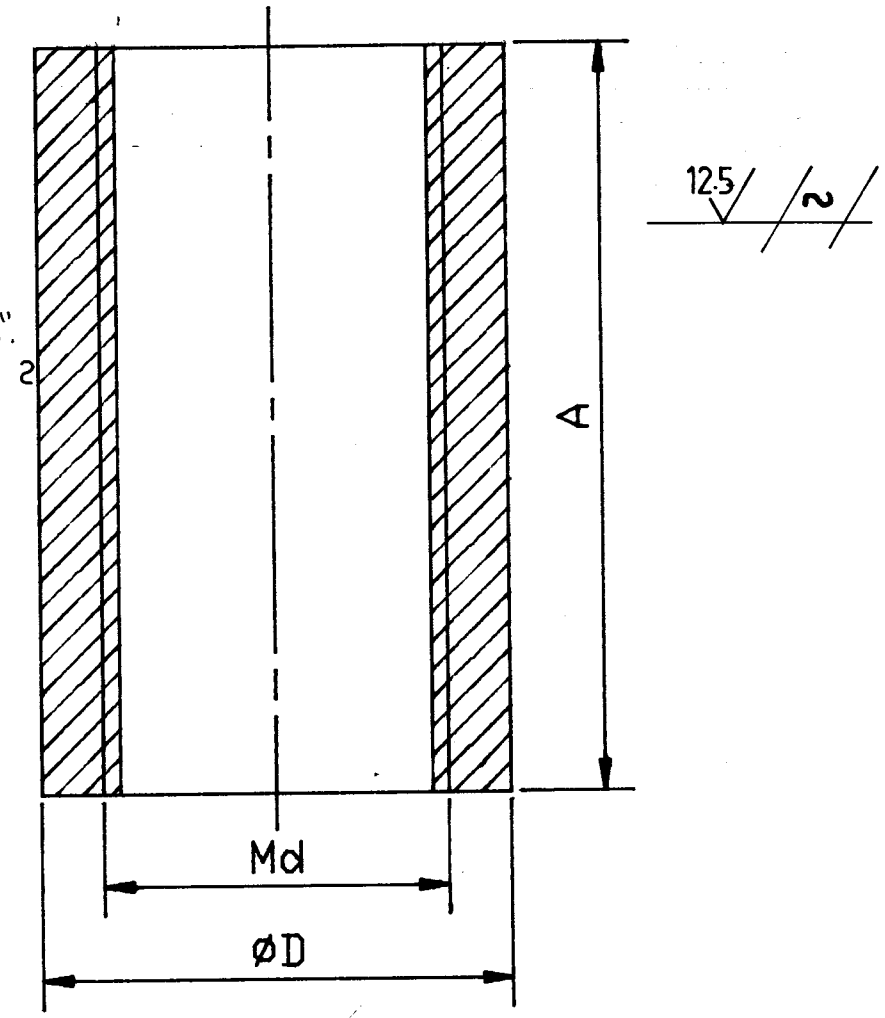
MATERIAL:

VAR.NO.01 TO 15-SA105.

MATL.EQUIVALENT. IS1875 CL.3 (OR) IS 961 Fe540 WHT (OR) BS 970 080 M40. 01

NOTES:

1) "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".



VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS

REV	DATE	ALTERED
01	15-11-1999	CHECKED

MATL BS970 EN8 CHANGED TO BS970 080 M40, IN MATL-EQUIVALENT-NOTE.

REV	DATE	ALTERED:
02	07/03/07	APPROVED:

NOTE-01 ADDED

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.ANANTH			
CHD.	M.M.MANI		4/10	
APPD.	J.JUDE		4x88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: COUPLING

CARD CODE: U 01

DRAWING No.: 3-80-999-99188.

REV.: 02

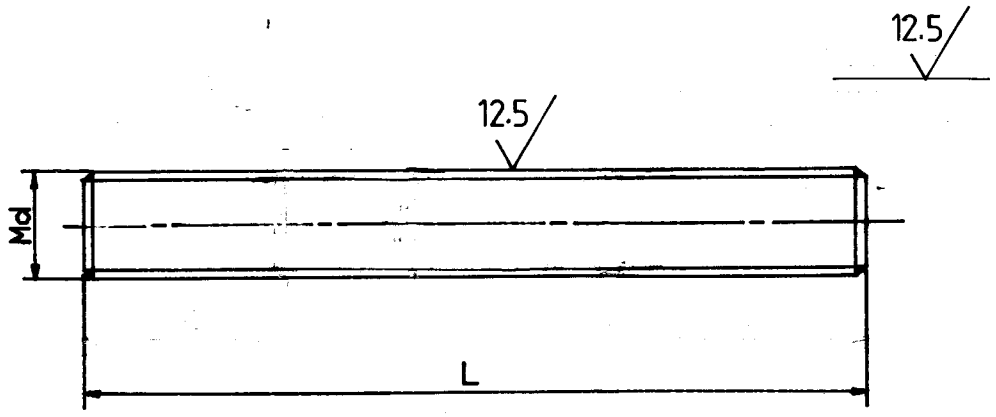
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99189.

VAR NO.	Md	A ROD DIA	A 01	A 01	L		MATL CODE	WEIGHT (Kg).	REMARKS
01	M12x1.75	12	230	35	287		15-004-030	0.255	
02	M12x1.75	12	230	35	287		15-004-030	0.255	
03	M12x1.75	12	230	35	287		15-004-030	0.255	
04	M12x1.75	12	230	35	288		15-004-030	0.255	
05	M16x2.00	16	240	45	313		15-004-106	0.494	
06	M16x2.00	16	240	45	315		15-004-106	0.500	
07	M20x2.50	22	250	55	345		15-339-343	0.850	
08	M24x3.00	25	260	65	368		15-339-139	1.310	
09	M24x3.00	25	260	70	372		15-339-139	1.320	
10	M30x3.50	32	270	80	412		15-339-140	2.290	
11	M36x4.00	36	285	95	451		15-339-280	3.600	
12	M48x5.00	48	310	120	521		15-339-142	7.400	
13	M56x4.00	56	330	145	575		15-339-143	11.120	
14	M68x4.00	68	355	175	667		15-339-144	19.020	
15	M85x4.00	85	390	210	768		15-339-134	34.210	



MATERIAL:

VAR.NO. 01 TO 06 - ~~BMC 20~~ 02 IS 2062 Fe 410 WA.

VAR.NO. 07 TO 15 - SA 105

NOTES:

01. MATL.EQUIVALENT: IS 1875 CL.3 OR IS 961 Fe 540 WHT OR BS 970 080 M40. 02

02. THIS COMPONENT SHALL BE ELECTRO GALVANIZED TO A DEPTH OF 15 µM. AND THREDED PORTIONS SHALL BE YELLOW CHROMATISED.

03. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105". 03

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	R.ANANTH.		14/10/98	
CHD.	M.M.MANI		14/10/98	
APPD.	J. JUDE		14X88	

REV	DATE	ALTD:	APPD:	NOTE
03	21/3/00			NOTE 03 ADDED.

REV	DATE	ALTD	APPD	NOTE
02	15-11-1999			FOR VAR NO. 01 TO 06 MATL ALTERED FROM BMC20 TO IS 2062 Fe 410 WA. IN NOTE NO. 1 MATL BS 970 EN8 CHANGED TO BS 970 080 M40.

REV	DATE	ALTERED / CHECKED	NOTE
01	3/3/98		TOP TIE ROD IS CHANGED AS FULLY THREADED. DIM. 'B' & 'C' REMOVED. DIM 'A' CHANGED AS ROD DIA.

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: TOP TIE ROD (TYPE: SA-160)

CARD CODE: U 01

DRAWING No.: 3-80-999-99189.

REV.: 03

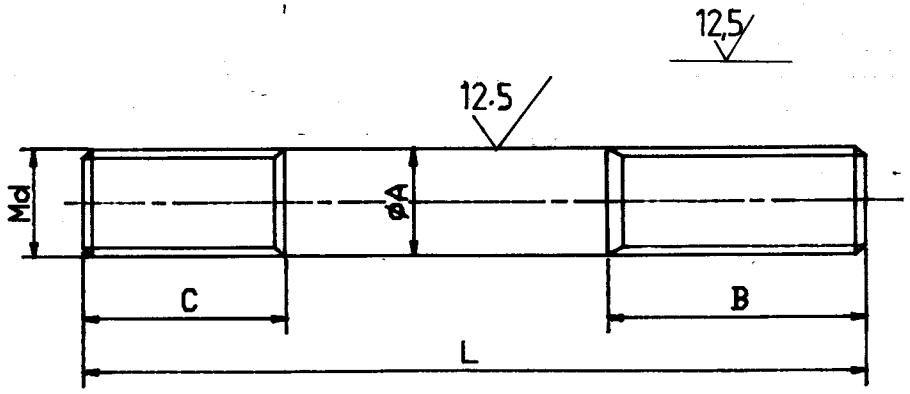
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 06166-666-08-E

VAR NO.	Md	A	B	C	L		MATL CODE	WEIGHT (Kg).	REMARKS
01	M12x1.75	12	140	35	495		15-004-030	0.440	
02	M12x1.75	12	140	35	485		15-004-030	0.430	
03	M12x1.75	12	140	35	679		15-004-030	0.600	
04	M12x1.75	12	140	35	712		15-004-030	0.630	
05	M16x2.00	16	160	45	781		15-004-106	1.230	
06	M16x2.00	16	160	45	774		15-004-106	1.220	
07	M20x2.50	22	170	55	774		15-339-343	1.910	
08	M24x3.00	25	180	65	1000		15-339-139	3.550	
09	M24x3.00	25	180	70	1112 (01)		15-339-139	3.966 (01)	
10	M30x3.50	32	200	80	1228		15-339-140	6.810	
11	M36x4.00	36	210	95	1170		15-339-280	9.350	
12	M48x5.00	48	260	120	1278		15-339-142	18.150	
13	M56x4.00	56	270	145	1517		15-339-143	29.330	
14	M68x4.00	68	320	175	2236		15-339-144	63.800	
15	M85x4.00	85	396	210	2548		15-339-134	113.500	



MATERIAL:
FOR VAR.NO. 01 TO 06 - ~~IS 226~~ (02) IS 2062 Fe 410 WA.
FOR VAR.NO. 07 TO 15 - SA105

NOTES: 01. MATL. EQUIVALENT: IS 1875 CL.3 OR IS 961 Fe 540 WHT OR BS 970 080 M40. (02)
02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µ.M. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
(03) 03. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	QS

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL.		11.10.88	
CHD.	M.M.MANI.		14/10	
APPD.	J. JUDE.		14x88	

REV	DATE	ALTD: / APPD:	NOTE
03	07/10/[illegible]	[illegible] / [illegible]	NOTE-03 ADDED.

REV	DATE	ALTERED / APPROVED	NOTE
02	15-11-1999	[illegible] / [illegible]	FOR VAR-NOS 01 TO 06 MATL ALTERED FROM IS 226 TO IS 2062 Fe 410 WA. IN NOTE NO.01 MATL BS 970 EN 8 CHANGED TO BS 970 080 M 40.

REV	DATE	ALTERED / CHECKED	NOTE
01	19/6/89	[illegible] / [illegible]	FOR VAR NO-09 – DIMENSION 'L' ALTERED FROM 1056 TO 1112; WEIGHT ALTERED FROM 3.750 TO 3.966 Kg.

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: BOTTOM TIE ROD (TYPE: SA-160)

CARD CODE: U 01

DRAWING No.: 3-80-999-99190.

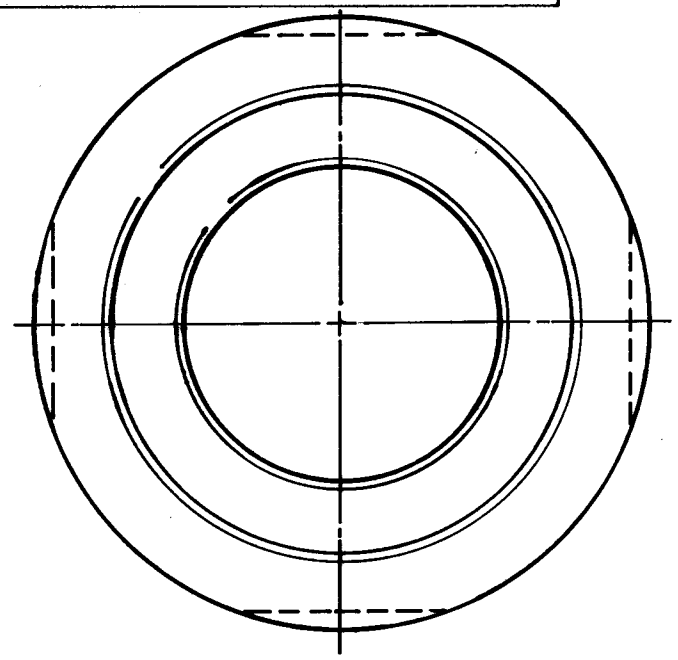
REV.: 03

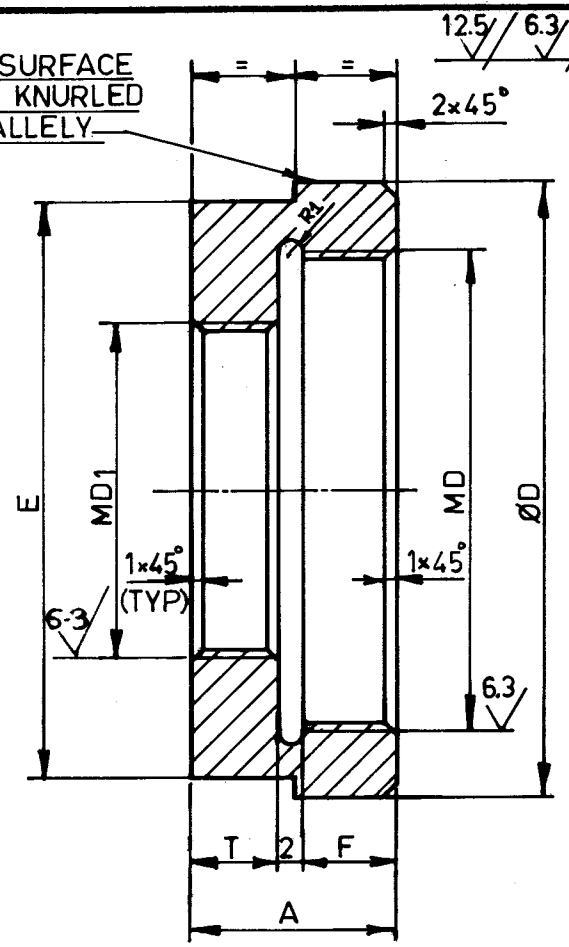
SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING NO. 3-80-999-99192





NOTES:

01. MATL. EQUIVALENT: IS 1875 CL 3 (OR) IS 961 Fe 540. WHT (OR) BS:970 080 M40
02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
04. "IS:1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

VAR NO.	ØD	MD	MD_1	E	A	F	T			REMARKS
01 TO 04	50	M42×1·5	M30×1·5	46	27	20	5			
05 & 06	60	M50×1·5	M36×1·5	55	27	20	5			
07	70	M58×1·5	M42×1·5	65	27	20	5			
08 & 09	80	M64×1·5	M50×1·5	75	40	30	8			
10	90	M75×2 (01)	M58×1·5	85	50	40	8			
11	110	M90×2·0	M75×2 (02)	105	52	40	10			
12	136	M110×2·0	M95×2·0	130	74	60	12			
13	155	M125×2·0	M105×2·0	145	96	80	14			
14										
15										

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
15										
14										
13		ROUND ϕ155		3-80-999-99192.		15 339 282 / SA 105	C		5,370	
12		ROUND ϕ136				15 339 282 / SA 105	C		3,150	
11		ROUND ϕ110				15 339 281 / SA105	C		1,440	
10		ROUND ϕ 90				15 339 134 / SA105	C		0,870	
08 & 09		ROUND ϕ 80				15 339 134 / SA105	C		0,650	
07		ROUND ϕ70				15 339 144 / SA105	C		0,310	
05 & 06		ROUND ϕ60				15 339 143 / SA105	C		0,220	
01 & 04		ROUND ϕ50				15 339 143 / SA105	C		0,150	

REV	DATE	ALTERED / CHECKED
02	01/11/99	

In Note No. 01 MATL: BS 970 EN8 Changed to BS 970 080 M40

REV	DATE	ALTERED / APPROVED
03	07/03/07	

NOTE. 04 ADDED.

REV	DATE	ALTERED / CHECKED
01	7/6/94	

FOR VAR 10 MD' AND FOR VAR 12 MD1 ALTD FROM M75X1·5 TO M75X2.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL		03.11.88	
CHD.	M.M. MANI.		26/11	
APPD.	J.JUDE.		26×188	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: HYDRAULIC LOCK NUT

CARD CODE: U 01

DRAWING No.: 3-80-999-99192

REV.: 03

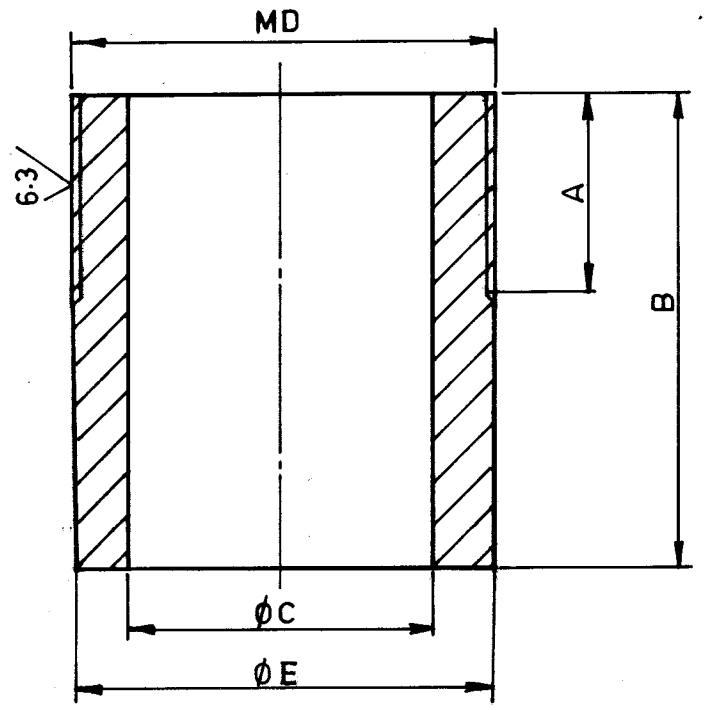
FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99194

12.5 / 6.3 /

NOTES:
01. MATERIAL EQUIVALENT: IS 961 Fe540 WHT.
~~02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µM. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.~~
~~03. STAMPING MARKING SHALL BE DONE AFTER GALVANISING.~~
03 04. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105"



VAR. NO.	A	B	ØC	MD	ØE					REMARKS
01 TO 04	25	100	30	M42 x1·5	42					
05 & 06	30	100	41	M50 x1·5	50					
07	35	100	51	M58 x1·5	58					
08 & 09	40	100	56	M64 x1·5	64					
10	45	100	63	M75x2 02	75					
11	50	100	76	M90x2·0	90					
12	55	100	91	M110x2·0	110					
13	60	116	105	M125x2·0	125					
14										
15										

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
	15	ROUND ø								
	14	ROUND ø								
	13	ROUND ø 125		3-80-999-99194.		15 339 281 / SA 105	C		2 830	
	12	ROUND ø 110				15 339 281 / SA 105	C		2 350	
	11	ROUND ø 90				15 339 134 / SA105	C		1 430	
	10	ROUND ø 75				15 339 144 / SA 105	C		1 020	
	08 & 09	ROUND ø 64				15 339 144 / SA105	C		0 592	
	07	ROUND ø 58				15 339 143 / SA105	C		0 470	
	05 & 06	ROUND ø 50				15 339 143 / SA105	C		0 505	
	01 TO 04	ROUND ø 42				15 339 142 / SA105	C		0 533	

REV	DATE	ALTD: / APPD:
03	07/06/94	ALTD: / APPD:

NOTE. 04 ADDED.

REV	DATE	ALTERED / APPROVED
01	18/2/94	ALTERED: / APPROVED: S.E.K

NOTES 02 & 03 DELETED.

REV	DATE	ALTERED / APPROVED
02	7/6/94	ALTERED: / APPROVED:

FOR VAR 10, THREAD SIZE ALTD FROM M 75x1·5 TO M75x2.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	P.S.VEL.		12.11.88.
CHD.	M.M.MANI.		26/11
APPD.	J. JUDE.		26x188

No. OF VAR.:

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: BOTTOM SOCKET (TYPE. SS-80)

CARD CODE: U 01

DRAWING No.: 3-80-999-99194.

REV.: 03

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

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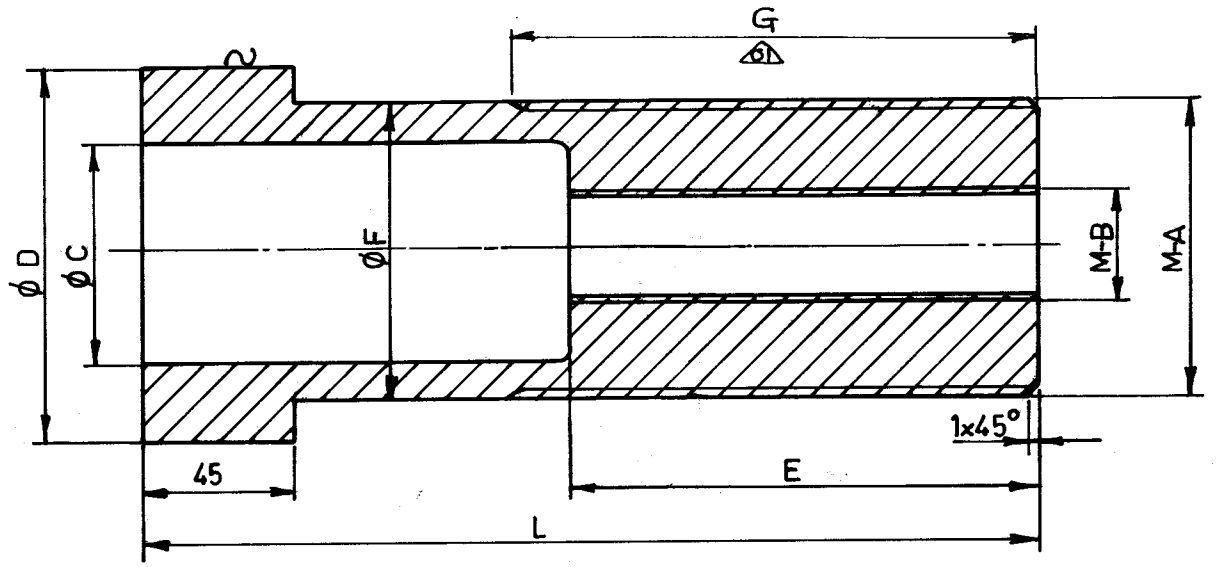
DRAWING No. 3-80-999-99195

12·5

NOTES:—
01. MATERIAL EQUIVALENT: IS 961 Fe 540 WHT.
02. THIS COMPONENT SHALL BE ELECTRO GALVANIZED TO A DEPTH OF 15 µM. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
03 04. "IS 1875 CL 2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".



VAR. NO.	M-A	M-B	ϕC	ϕD	E	ϕF	L	G 01		REMARKS.
01 TO 03	M20×1·5	M12×1·75	12·5	25	50	20	260	120		
04	M20×1·5	M12×1·75	12.5	25	50	20	265	120		
05 & 06	M30×1·5	M16×2·0	17	36	50	30	265	120		
07	M36×1·5	M20×2·5	22	40	50	36	265	120		
08	M42×1·5	M24×3·0	25	50	50	42	275	150		
09	M42×1·5	M24×3·0	25	50	50	42	280	150		
10	M50×1·5	M30×3·5	33	63	50	50	285	150		
11	M58×1·5	M36×4·0	39	63	60	58	290	160		
12 02	M75×2	M48×5·0	51	80	60	75	305	180		
13	M90×2·0	M56×4·0	59	100	70	90	335	200		
14										
15										

VARIAN'l No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	GS
	15	ROUND ϕ								
	14	ROUND ϕ								
	13	ROUND ϕ 100		3-80-999-99195.		15 339 134 / SA 105	C		10 465	
	12	ROUND ϕ 80				15 339 144 / SA 105	C		6 011	
	11	ROUND ϕ 63				15 339 143 / SA 105	C		3 547	
	10	ROUND ϕ 63				15 339 143 / SA 105	C		2 946	
	09	ROUND ϕ 50				15 339 142 / SA 105	C		2 038	
	08	ROUND ϕ 50				15 339 142 / SA 105	C		2 006	
	07	ROUND ϕ 40				15 339 141 / SA 105	C		1 377	
	05 & 06	ROUND ϕ 36				15 339 280 / SA 105	C		1 023	
	04	ROUND ϕ 25				15 339 139 / SA 105	C		0 373	
	01 TO 03	ROUND ϕ 25				15 339 139 / SA 105	C		0 355	

REV	DATE	ALTERED / APPROVED
02	7/6/94	ALTERED: / APPROVED:

FOR VAR 12, THREAD SIZE 'MA' ALTD FROM M75X1·5 TO M75X2

REV	DATE	ALTERED / APPROVED
03	07/03/07	ALTERED: / APPROVED:

NOTE 04 ADDED.

REV	DATE	ALTERED / CHECKED
01	28/12/89	ALTERED / CHECKED 28/12

DIMENSION 'G' FOR THREAD LENGTH (M-A) INCLUDED. DIMENSION 'C' ALTERED FOR VAR-NOS. 01 TO 09.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S. VEL.		25.11.88.	
CHD.	M.M. MANI.		26/11	
APPD.	J. JUDE.		26/12/88	

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: SPINDLE PIPE. (TYPE : SS-80)

CARD CODE: U 01

DRAWING No.: 3-80-999-99195.

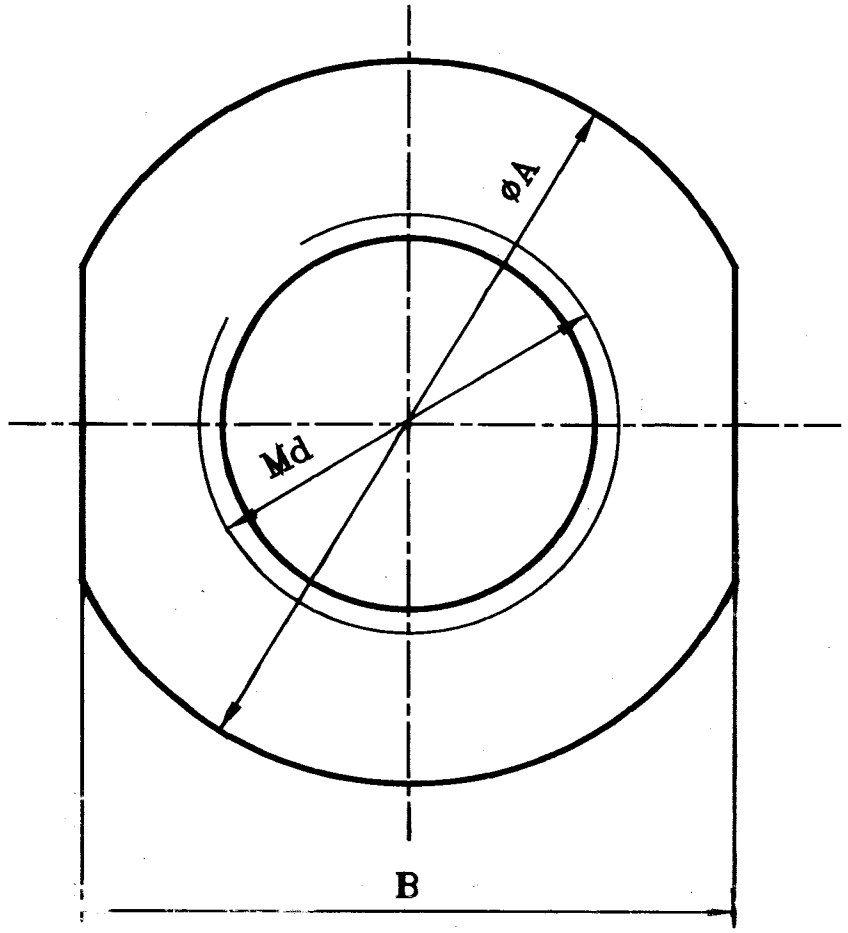
REV.: 03

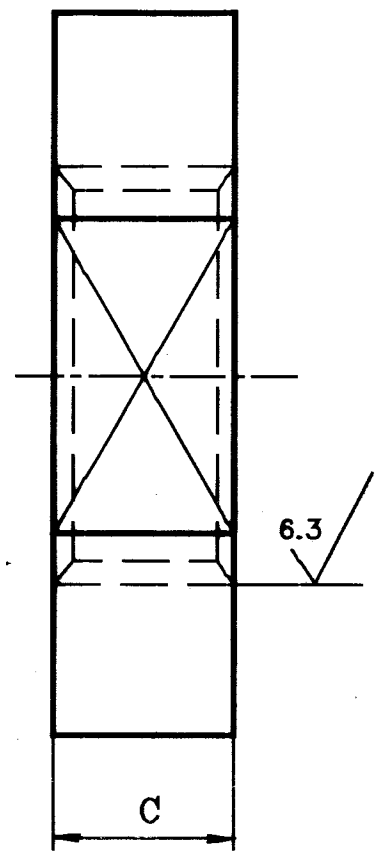
SIZE A3

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. **3-80-999-99200**

VAR.No	Md x PITCH	øA	B	C	WT (kg)	MATL.CODE
01 TO 04	M 12 x 1.75	22	19	6	0.012	15 339 343
05 & 06	M 16 x 2.00	32	24	8	0.036	15 339 140
07	M 20 x 2.50	36	30	10	0.054	15 339 280
08 & 09	M 24 x 3.00	40	36	12	0.071	15 339 141
10	M 30 x 3.50	50	46	15	0.147	15 339 142
11	M 36 x 4.00	63	55	18	0.295	15 339 143
12	M 48 x 5.00	80	70	24	0.600	15 339 144
13	M 56x 4.00	100	85	28	1.180	15 339 134





12.5 6.3

MATERIAL SA105

NOTES: –

01. EQUIVALENT MATERIAL IS:1875 CL.IV (OR) BS.970 709 M40.
02. THE COMPONENT SHALL BE GALVANISED TO A DEPTH OF 15 µm AND THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
03. THREAD TOLERANCE AS PER 6H OF IS:4218.
04. "I.S.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105".

REV	DATE	ALTERED / APPROVED	REV	DATE	ALTERED / APPROVED
02	07/03/07	APPROVED	01	03.12.99	APPROVED
ZONE	NOTE-4 ADDED.		ZONE	In Note No:–01 Matl.'BS970-EN19' Changed to 'BS970-709 M40.'	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, CHENNAI 600 017

	NAME	SIGN	DATE	NO OF ITEMS
DRN	R.SRINIVASAN	–Sd–	28/10/99	
CHD	M.M.MANI	–Sd–	28/10/99	
APPD	J.JUDE	–Sd–	28/10/99	

DEPT. CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	DRG.REDRAWN ON 03.12.99	ITEM No.
	C/M/F	N.T.S		REDRAWN K.N.RAMESH; APPROVED R.ARANTH	

TITLE: LOCK NUT

CARD CODE: U 01

DRAWING No.: 3-80-999-99200

REV: 02

SIZE A3

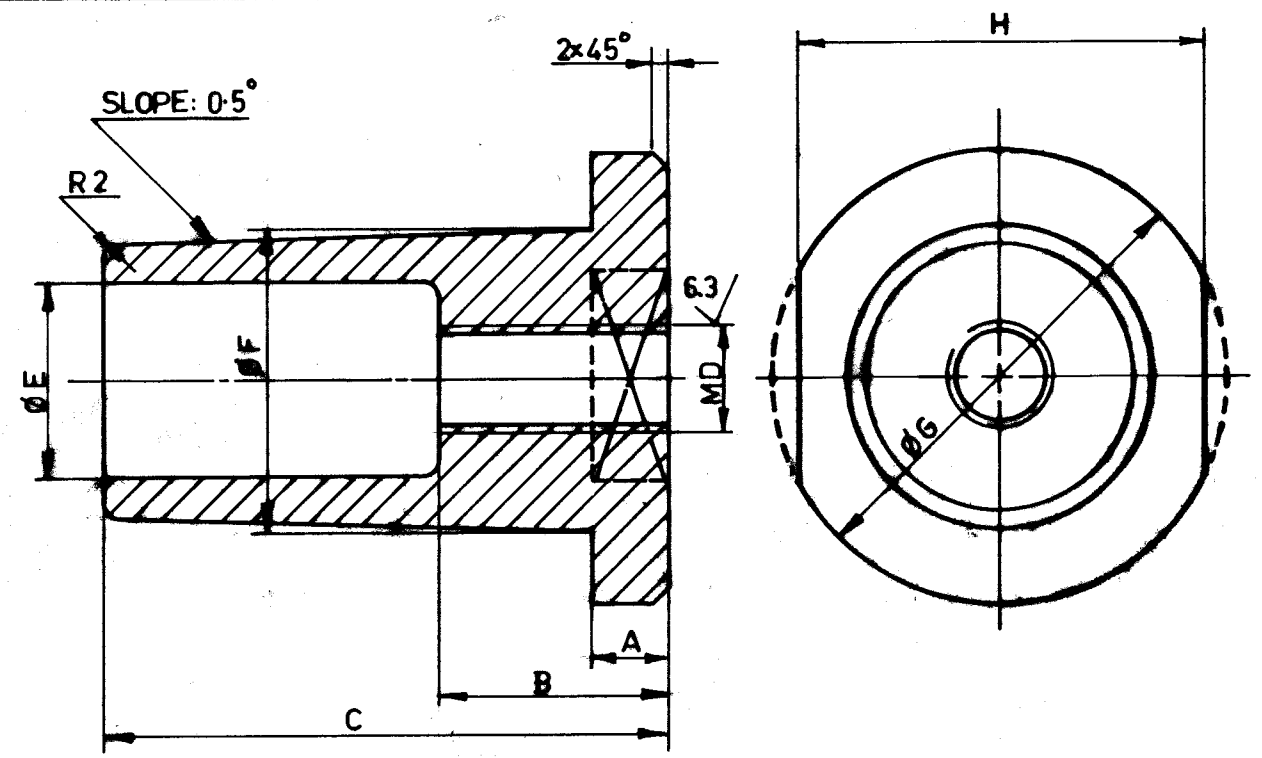
V1A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-229/C.

DRAWING No. 3-80-999-99201

12.5 / 6.3



NOTES:-

01. MATERIAL EQUIVALENT: IS 1875 CL. 3 (OR) IS 961 Fe 540WHT(OR) BS: 970 080 M40 (02)
02. THIS COMPONENT SHALL BE ELECTRO-GALVANIZED TO A DEPTH OF 15 µ.M. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AETER GALVANISING.
(03) 04. "IS.1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105."

VAR. NO.	A	B	C	MD	ØE	ØF	ØG	H		REMARKS
01 TO 04	10	15	200	M20×1·5	22	28	36	32		
05 & 06	10	20	200	M30×1·5	32	40	46	41		
07	10	20	200	M36×1·5	38	50	54	50		
08 & 09	15	25	205	M42×1·5	44	55	60	55		
10	20	35	210	M50×1·5	52	62	70	65		
11	20	30	210	M58×1·5	60	75	85	80		
12	30	45	220	M75×2 (01)	77	90	103	95		
13	40	60	230	M90×2·0	92	104	118	118		
14										
15										

VARIANT No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT WT. / QTY.	S
	15	ROUND ϕ								
	14	ROUND ϕ								
	13	ROUND ϕ 118		3-80-999-99201		15 339 281 / SA 105	C		7.770	
	12	ROUND ϕ 103				15 339 281 / SA 105	C		6.350	
	11	ROUND ϕ 85				15 339 134 / SA 105	C		4.690	
	10	ROUND ϕ 70				15 339 144 / SA105	C		2.840	
	08 & 09	ROUND ϕ 60				15 339 143 / SA 105	C		2.100	
	07	ROUND ϕ 54				15 339 143 / SA105	C		1.810	
	05 & 06	ROUND ϕ 46				15 339 142 / SA105	C		1.340	
	01 TO 04	ROUND ϕ 36				15 339 141 / SA105	C		0.990	

REV	DATE	ALTERED / CHECKED
02	01/11/99	

In Note No:-01 MATL. BS 970 EN 8 Changed to BS 970 080 M40

REV	DATE	ALTERED / APPROVED
03	07/03/07	

NOTE-04 ADDED.

REV	DATE	ALTERED / CHECKED
01	7/6/99	

FOR VAR 12, THREAD SIZE ALTD FROM M75x1·5 TO M75x2.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd., BOILER PLANT UNIT TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	P.S.VEL.		09-11-88
CHD.	M.M.MANI.	--Sd--	
APPD.	J. JUDE.	--Sd--	

No. OF VAR.:

DEPT	GRADE OF UNTOL DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS			

TITLE: CENTERING NUT (TYPE SS-160)

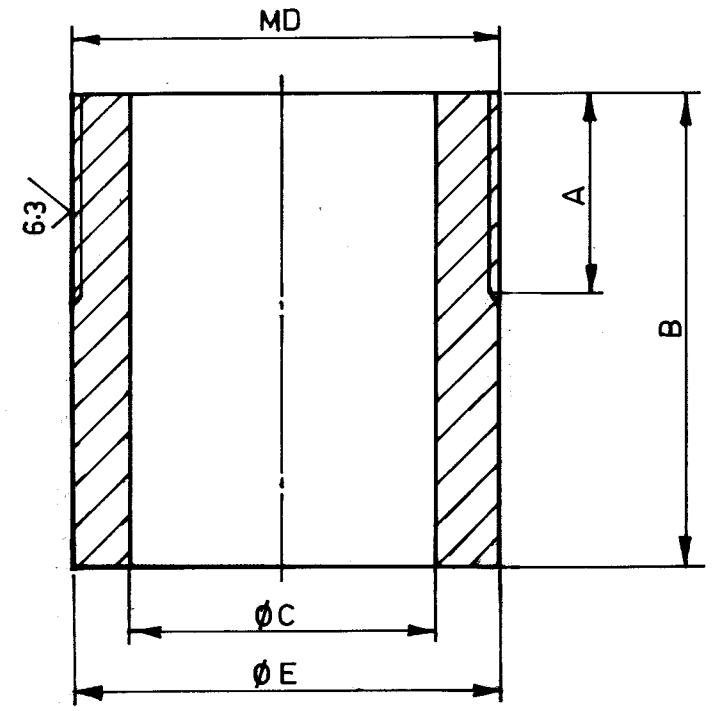
CARD CODE: U 01

DRAWING No.: 3-80-999-99201 REV.: 03

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-999-99202.

12.5 / 6.3



NOTES:
01. MATERIAL EQUIVALENT: IS 961 Fe 540 WHT.
~~02. THIS COMPONENT SHALL BE ELECTRO GALVANIZED TO A DEPTH OF 15 MM. AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.~~
~~03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.~~
01
03 04. "IS:1875 CL2" IS ALSO ACCEPTABLE IN PLACE OF "SA105."

VAR. NO.	A	B	ØC	MD	Ø E					REMARKS
01 TO 04	25	190	30	M42×1·5	42					
05 & 06	30	190	41	M50×1·5	50					
07	35	190	51	M58×1·5	58					
08 & 09	40	190	56	M64×1·5	64					
10	45	190	63	M75×2 02	75					
11	50	190	76	M90×2·0	90					
12	55	190	91	M110×2·0	110					
13	60	190	105	M125×2·0	125					
14										
15										

VARIAN No.	ITEM No.	DESCRIPTION	STD	DRAWING No.	ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A/C	UNIT	UNIT. WT. / QTY.	
	15	ROUND Ø								
	14	ROUND Ø								
	13	ROUND Ø 125		3-80-999-99202.		15 339 281 / SA 105	C		4,630	
	12	ROUND Ø110				15 339 281 / SA 105	C		4,465	
	11	ROUND Ø90				15 339 134 / SA105	C		2,717	
	10	ROUND Ø75				15 339 144 / SA105	C		1,938	
	08 & 09	ROUND Ø64				15 339 144 / SA105	C		1,124	
	07	ROUND Ø58				15 339 143 / SA105	C		0,893	
	05 & 06	ROUND Ø50				15 339 143 / SA105	C		0,956	
	01 TO 04	ROUND Ø42				15 339 142 / SA105	C		1,010	

REV	DATE	ALTD: / APPD:	
03	07/03/97		NOTE-4 ADDED

REV	DATE	ALTERED / APPROVED	
01	18/2/94		NOTES 02 & 03 DELETED.
02	7/6/94		FOR VAR 10, THREAD SIZE ALTD FROM M75x1.5 TO M75x2.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE	No. OF VAR.
DRN.	P.S.VEL.		16.11.88	
CHD.	M.M.MANI.	-- Sd --		
APPD.	J. JUDE.	-- Sd --		

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE	CARD CODE	DRAWING No.	REV.
BOTTOM SOCKET (TYPE: SS 160)	U 01	3-80-999-99202.	03

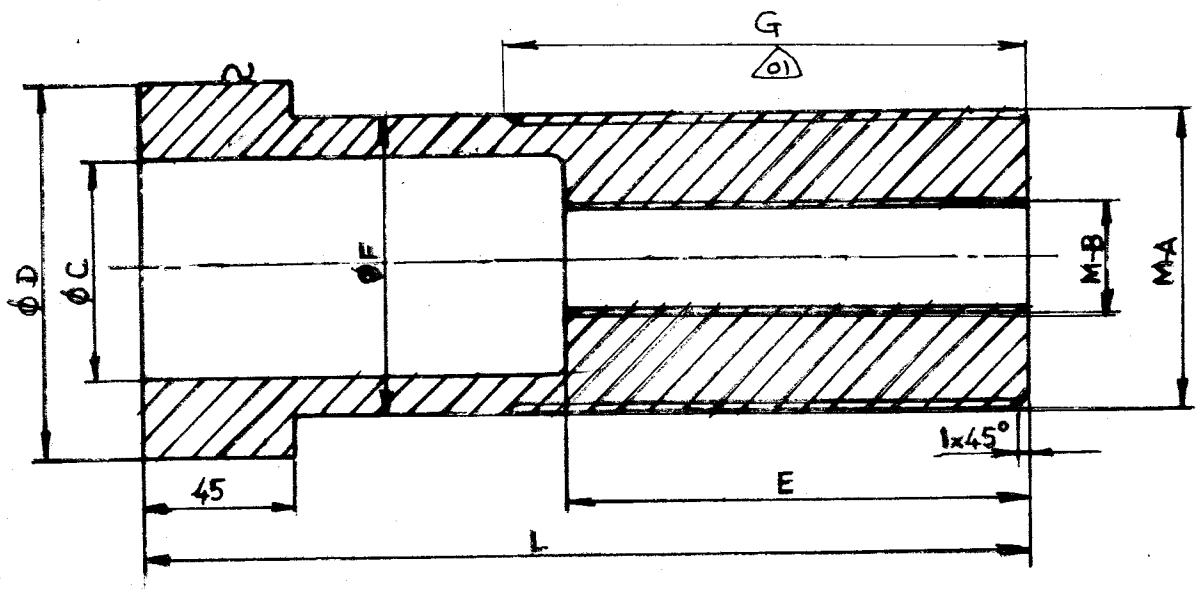
SIZE A3

3-80-999-99206

ON DRAWING

12-5 / 2

NOTES:—
01. MATERIAL EQUIVALENT I.S. 961 Fe 540 WHT.
02. THIS COMPONENT SHALL BE ELECTRO GALVANIZED TO A DEPTH OF 15 µM AND THREADED PORTIONS SHALL BE YELLOW CHROMATISED.
03. THREAD MATCHING SHALL BE DONE AFTER GALVANISING.
03 04. "IS 1875 CL 2" IS ALSO ACCEPTABLE IN PLACE OF "SA 105".



VAR. NO.	M-A	M-B	ϕC	ϕD	E	ϕF	L	G 01		REMARKS.
01 TO 03	M20x1·5	M12x1·75	12·5	25	50	20	450	240		
04	M20x1·5	M12x1·75	12·5	25	50	20	455	240		
05 & 06	M30x1·5	M16x2·0	17	36	50	30	455	240		
07	M36x1·5	M20x2·5	22	40	50	36	455	240		
08	M42x1·5	M24x3·0	25	50	50	42	465	290		
09	M42x1·5	M24x3·0	25	50	50	42	470	290		
10	M50x1·5	M30x3·5	33	63	50	50	475	300		
11	M58x1·5	M36x4·0	39	63	60	58	480	310		
12 02	M75x2	M48x5·0	51	80	60	75	495	320		
13	M90x2·0	M56x4·0	59	100	70	90	510	340		
14										
15										

	15	ROUND ϕ												
	14	ROUND ϕ												
	13	ROUND ϕ100		3-80-999-99206			15 339 134 / SA 105	C		15 495				
	12	ROUND ϕ 80					15 339 144 / SA 105	C		9 572				
	11	ROUND ϕ63					15 339 143 / SA 105	C		5 721				
	10	ROUND ϕ 63					15 339 143 / SA 105	C		4 635				
	09	ROUND ϕ 50					15 339 142 / SA 105	C		3 268				
	08	ROUND ϕ 50					15 339 142 / SA 105	C		3 236				
	07	ROUND ϕ40					15 339 141 / SA 105	C		2 283				
	05 & 06	ROUND ϕ36					15 339 280 / SA 105	C		1 665				
	04	ROUND ϕ25					15 339 139 / SA 105	C		0 583				
	01 TO 03	ROUND ϕ25					15 339 139 / SA 105	C		0 566				
	VAR. No.	DESCRIPTION	STD	DRAWING No.			ITEM No. / VAR. No.	MATL. CODE / MATL. SPEC.	A / C	UNIT	UNIT. WT. / QTY.			

CAUTION. THE INFORMATION OF 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.

REV	DATE	ALTERED:
02	7/6/94	APPROVED:

FOR VAR 12, THREAD SIZE MA ALTD FROM M75x1·5 TO M75x2.

REV	DATE	ALTERED:
03	07/03/07	APPROVED:

NOTE - 04 ADDED.

REV	DATE	ALTERED
01	28/12/88	CHECKED

DIMENSION 'G' FOR THREAD LENGTH (M-A) INCLUDED. DIMENSION C ALTERED FOR VAR-NOS. 01 TO 09.

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: STANDARD

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI 620 014

	NAME	SIGN	DATE
DRN.	P.S.VEL.		25.11.88
CHD	M.M.MANI		25.11
APPD.	J.JUDE.		26.11.88

NO. OF VAR.

DEPT	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg)	REF. TO ASSY/ OLD DRG.	ITEM No.
	C/M/F	NTS.			

TITLE: SPINDLE PIPE.
(TYPE; SS-160)

CARD CODE: U 01

DRAWING No.: 3-80-999-99206

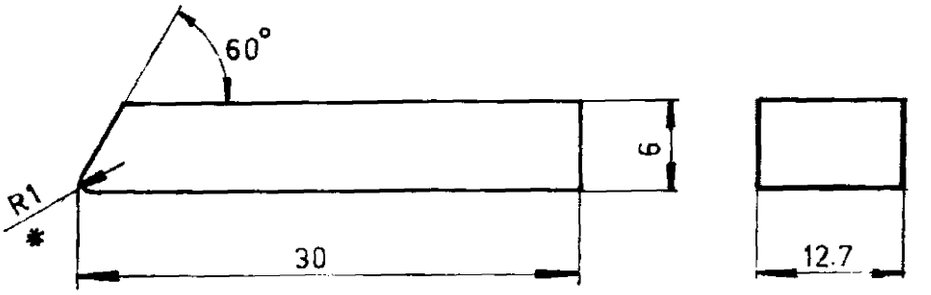
REV.: 02

SIZE A3

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMET

REV	DATE	ALTERED	REV	DATE	ALTERED
01	04-01-2000	CHECKED	02		CHECKED

MATERIAL CHANGED FROM BMC 20 TO IS 2062 Fe 410 WA. NOTE-2 DELETED



NOTE:-

1) * RADIUS R1 TO BE PROVIDED BY HAND GRINDING. POINTER TIP TO BE COATED WITH BRIGHT RED OR ORANGE COLOUR FLUORESCENT PAINT.

01 ~~2) EQUIVALENT MATERIAL : IS 226 OR IS 2062~~

	FLAT. 12.7X6, L=30	15-008-283			0.017
		IS 2062 Fe 410 WA 01			1
VARIANT No.	DESCRIPTION	STD	MATL CODE	A C	UNIT WT
			MATL SPEC		QTY.

BHARAT HEAVY ELECTRICALS LTD.
BOILER PLANT UNIT
TIRUCHIRAPALLI-620014.

	NAME	SIGN	DATE
DRN.	R. Srinivasan.		
CHD.	M. Masilamani.		18/6/88
APPD.	J. Jude.		210688

DEPT. CODE	GRADE OF UNTOL DIM C/M/F		SCALE	WEIGHT (Kg)	REF TO ASSY/OLD DRG	ITEM No.
			NTS	0.017		10

TITLE	CARD CODE	DRAWING No.	REV
POINTER	U01	4-80-999-99047.	01

SCOPE OF SUPPLY FOR VLH-SA-080 (WITHOUT SPRING)						ANNEXURE-VSA-080
SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99175	1	PIPE	IS-1239	
2	BOTTOM PLATE	3-80-999-99179	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99180	1	PLATE	IS2062	
4	TOP TIE ROD	3-80-999-99181	1	ROUND	IS2062	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99182	1	PLATE	IS2062	
9	BEARING PLATE ASSLY.	3-80-999-99183	1			
9.1	BEARING PLATE	3-80-999-99185	1	PLATE	IS2062	TO BE SUPPLIED IN ASSEMBLED CONDITION
9.2	BUSH	3-80-999-99184	1		SA193 B7	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
15	TURN BUCKLE	2-80-999-99140	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA210 Gr. A1	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-80-999-99151	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	3			
18	BOTTOM TIE ROD	3-80-999-99186	1	ROUND	IS2062	
20	SPHERICAL WASHER	3-80-999-99187	1		SA193 B7	
21	COUPLING	3-80-999-99188	1	ROUND	SA105	
22	NUT	STANDARD	2			

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SA-160 (WITHOUT SPRING)						ANNEXURE-VSA-160
SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99176	1	PIPE	IS-1239	
2	BOTTOM PLATE	3-80-999-99179	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99180	1	PLATE	IS2062	
4	TOP TIE ROD	3-80-999-99189	1	ROUND	SA105	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99182	1	PLATE	IS2062	
9	BEARING PLATE ASSLY.	3-80-999-99183	1	PLATE	IS2062	
9.1	BEARING PLATE	3-80-999-99185	1	PLATE	IS2062	
9.2	BUSH	3-80-999-99184	1		SA193 B7	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	TO BE SUPPLIED IN ASSEMBLED CONDITION
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	IS-1239	
15	TURN BUCKLE	2-80-999-99140	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA106 Gr. B	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-80-999-99151	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	3			
18	BOTTOM TIE ROD	3-80-999-99190	1	ROUND	SA105	
20	SPHERICAL WASHER	3-80-999-99187	1		SA193 B7	
21	COUPLING	3-80-999-99188	1	ROUND	SA105	
22	NUT	STANDARD	2			
23	MIDDLE PLATE ASSLY.	2-80-999-99129	1			
23.1	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
23.2	MIDDLE PLATE	3-80-999-99140	1	PLATE	IS2062	

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SAT-080 (WITHOUT SPRING)						ANNEXURE-VSAT-080
DRG. SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99175	1	PIPE	IS-1239	TO BE SUPPLIED IN ASSEMBLED CONDITION
2	BOTTOM PLATE	3-80-999-99179	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99180	1	PLATE	IS2062	
4	TOP TIE ROD	3-80-999-99181	1	ROUND	SA105	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99182	1	PLATE	IS2062	
9	BEARING PLATE ASSLY.	3-80-999-99183	1	PLATE	IS2062	
9.1	BEARING PLATE	3-80-999-99185	1	PLATE	IS2062	
9.2	BUSH	3-80-999-99184	1		SA193 B7	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	IS-1239	
15	TURN BUCKLE	2-12-000-01853	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA106 Gr. B	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-12-000-06295	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	3			
18	BOTTOM TIE ROD	3-12-000-06351	1	ROUND	SA105	
20	SPHERICAL WASHER	3-80-999-99187	1		SA193 B7	
21	COUPLING	3-80-999-99188	1	ROUND	SA105	
22	NUT	STANDARD	2			

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SAT-160 (WITHOUT SPRING)

ANNEXURE-VSAT-160

SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99176	1	PIPE	IS-1239	
2	BOTTOM PLATE	3-80-999-99179	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99180	1	PLATE	IS2062	
4	TOP TIE ROD	3-80-999-99189	1	ROUND	SA105	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99182	1	PLATE	IS2062	
9	BEARING PLATE ASSLY.	3-80-999-99183	1	PLATE	IS2062	
9.1	BEARING PLATE	3-80-999-99185	1	PLATE	IS2062	
9.2	BUSH	3-80-999-99184	1		SA193 B7	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	TO BE SUPPLIED IN ASSEMBLED CONDITION
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	IS-1239	
15	TURN BUCKLE	2-12-000-01853	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA106 Gr. B	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-12-000-06295	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	3			
18	BOTTOM TIE ROD	3-12-000-06486	1	ROUND	SA105	
20	SPHERICAL WASHER	3-80-999-99187	1		SA193 B7	
21	COUPLING	3-80-999-99188	1	ROUND	SA105	
22	NUT	STANDARD	2			
23	MIDDLE PLATE ASSLY.	2-80-999-99129	1			
23.1	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
23.2	MIDDLE PLATE	3-80-999-99140	1	PLATE	IS2062	

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SH-080 (WITHOUT SPRING)

ANNEXURE-VSH-080

SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99157	1	PIPE	IS-1239	TO BE SUPPLIED IN ASSEMBLED CONDITION
2	TOP PLATE	2-80-999-99130	1	PLATE	IS2062	
3	BOTTOM PLATE	2-80-999-99135	1	PLATE	IS2062	
4	SPINDLE BOLT	2-80-999-99137	1	ROUND	SA105	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	2-80-999-99133	1	PLATE	IS2062	
9	LUG PLATE	2-80-999-99138	1	PLATE	IS2062	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	IS-1239	
15	TURN BUCKLE	2-80-999-99140	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA106 Gr. B	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-80-999-99151	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	1			
18	HAMMER DRIVEN SCREW	STANDARD	8			

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SH-11-160 (WITHOUT SPRING)

ANNEXURE-VSH-160

SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99149	1	PIPE	IS-1239	TO BE SUPPLIED IN ASSEMBLED CONDITION
2	TOP PLATE	2-80-999-99130	1	PLATE	IS2062	
3	BOTTOM PLATE	2-80-999-99135	1	PLATE	IS2062	
4	SPINDLE BOLT	2-80-999-99141	1	ROUND	SA105	
5	BOTTOM SOCKET	2-80-999-99136	1	ROUND	SA105	
6	CENTERING NUT	2-80-999-99131	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99153	1	ROUND	SA105	
8	SPRING PLATE	2-80-999-99133	1	PLATE	IS2062	
9	LUG PLATE	2-80-999-99138	1	PLATE	IS2062	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
14	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	IS-1239	
15	TURN BUCKLE	2-80-999-99140	1			
15.1	TURN BUCKLE BODY	2-80-999-99139	1	PIPE	SA106 Gr. B	
15.2	PLATE-1	3-80-999-99150	1	PLATE	SA105	
15.3	PLATE-2	3-80-999-99151	1	PLATE	SA105	
16	NUT	3-80-999-99152	1	ROUND	SA105	
17	SPLIT PIN	STANDARD	1			
18	MIDDLE PLATE ASSLY.	2-80-999-99129	1			
18.1	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
18.2	MIDDLE PLATE	3-80-999-99140	1	PLATE	IS2062	
19	HAMMER DRIVEN SCREW	STANDARD	8			

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SS-080 (WITHOUT SPRING)						ANNEXURE-VSS-080
SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99177	1	PIPE	IS-1239	TO BE SUPPLIED IN ASSEMBLED CONDITION
2	BOTTOM PLATE	3-80-999-99198	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99199	1	PLATE	IS2062	
4	SPINDLE PIPE	3-80-999-99195	1	ROUND	SA105	
5	BOTTOM SOCKET	3-80-999-99194	1	ROUND	SA105	
6	CENTERING NUT	3-80-999-99193	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99192	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99196	1	PLATE	IS2062	
9	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
15	ADJUSTMENT BOLT	3-80-999-99197	1	ROUND	SA193 B7	
16	LOCK NUT	3-80-999-99200	1	ROUND	SA105	
17	DISC	3-80-999-99174	1	ROUND	IS2062	

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

SCOPE OF SUPPLY FOR VLH-SS-160 (WITHOUT SPRING)						ANNEXURE-VSS-160
SL.NO.	DESCRIPTION	DRG. NO.	QPA	TYPE	SPECN,	
1	HOUSING	3-80-999-99178	1	PIPE	IS-1239	TO BE SUPPLIED IN ASSEMBLED CONDITION
2	BOTTOM PLATE	3-80-999-99198	1	PLATE	IS2062	
3	TOP PLATE	3-80-999-99199	1	PLATE	IS2062	
4	SPINDLE PIPE	3-80-999-99206	1	ROUND	SA105	
5	BOTTOM SOCKET	3-80-999-99202	1	ROUND	SA105	
6	CENTERING NUT	3-80-999-99201	1	ROUND	SA105	
7	HYD. LOCK NUT	3-80-999-99192	1	ROUND	SA105	
8	SPRING PLATE	3-80-999-99196	1	PLATE	IS2062	
9	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
10	POINTER	4-80-999-99047	2	FLAT	IS2062	
15	ADJUSTMENT BOLT	3-80-999-99197	1	ROUND	SA193 B7	
16	LOCK NUT	3-80-999-99200	1	ROUND	SA105	
17	DISC	3-80-999-99174	1	ROUND	IS2062	
18	MIDDLE PLATE ASSLY.	2-80-999-99129	1			
18.1	INNER PIPE GUIDE	3-80-999-99154	1	PIPE	SA192	
18.2	MIDDLE PLATE	3-80-999-99140	1	PLATE	IS2062	

NOTE- TOP PLATE IS TO BE TACK WELDED WITH HOUSING FOR EASY TRANSPORTATION AND AVOIDING MISPLACEMENT.

PROCEDURE FOR MANUFACTURING OF CONSTANT & VARIABLE LOAD HANGERS (CLH/VLH) (LISEGA DESIGN)

Objective: - This document covers the procedure to be followed for manufacturing of CLH & VLH.

The material normally used and their TDC nos. are given below :

Material Specification			TDC No.
Plates	:	IS 2062 Gr. A & B	TDC:0:301 Latest Revision
		SA 515/SA 516 Gr. 70	TDC:0:202 Latest Revision
		SA 387 Gr. 12 & 22	TDC:0:202 Latest Revision
Pipes	:	SA 106 Gr. B & C	TDC 0:101, 0:112 Latest Revision
Tubes	:	SA 210 Gr. A1 & C	TDC 0:102, 0:111 Latest Revision
Bars	:	SA 105	TDC 5:002 Latest Revision
		SA 193 B7	

1.0 Raw material procurement control including sub deliveries.

1.1 Raw material used shall conform to the relevant specification as given in the drawing and applicable TDC/PO. Any substitution of material shall be done only with prior approval of engineering through applicable document.

1.2 The raw material for the manufacturing of CLH & VLH shall be procured from BHEL approved vendors listed in BHEL PMD. List of approved Vendors shall be furnished with BHEL Tender enquiry and Purchase Order. **All the relevant test certificates / documents shall be original and in the name of raw material vendor.** Carbon steel material of thickness less than 20 mm can however be procured from traders if tested on random basis in NABL accredited labs for each melt or each lot identified by the tagging incoming material physically and correlating the same tag with the material receipt no. recorded in the day receipt register. The lab test report shall be enclosed with the copy of test certificates.

1.3 Ensure that the raw material procured as per the specification /TDC and shall have valid test certificates, indicating the mechanical/ chemical values and other test result as the case may be.

1.4 Raw material procured shall be free from visual defects like cracks, seams, laps, laminations, heavy pitting etc. when defects are noticed in visual inspection the same shall be confirmed using appropriate NDE technique and repaired using applicable approved process.

The detail of non-conformities shall be documented and analyzed for future improvement of process control.

1.5 Also ensure that the material are procured with the permitted dimensional tolerance of the material specification and / or TDC wherever required, the raw material shall be corrected prior to fabrication to achieve the required product tolerance.

1.6 TRACEABILITY OF RAW MATERIALS AT CLH/VLH MANUFACTURER'S WORKS

1.6.1 On receipt of the material, the practice of allotting day book no. shall be followed by hard stamping the day book no. material specification & heat no. on plates greater than 20 mm and stamping or stenciling day book no. and specification and heat no. on other material including plates of thickness less than 20 mm.

1.6.2 Raw material procured as stated under point 1.2 of note -1 shall be correlated to the mill test certificates, melt no. and specification ad the confirmation shall be transferred to the job / identified by the inspector by stamping suitably on the materials.

1.6.3 This identification shall be properly documented in the register and maintained suitably for each process till completion of the final product.

1.6.4 The scanned copy of the daybook detail along with the TC and invoice as applicable shall be sent to BHEL/HERP/VARANASI for review. The material shall be further processed only on acceptance of the material by BHEL/HERP/VARANASI and physical verification by HERP QC or AIA.

1.6.5 Subsequent transfer by punching of daybook no., material specification & heat no. on plates of thickness greater than 20 mm and transfer by punching /stenciling of day book no. & specification on other material including plate of thickness less than 20 mm shall be meticulously followed during further cutting /processing & witnessing by HERP QC or AIA. The Stamp of HERP QC or AIA shall be put while transferring the details.

1.7 The requirement of material traceability shall be as indicated in the respective drawings.

Product attest "P" items indicated as in the drawings are traceable to the test certificates and identified with the material specification, grade and melt no. by stamping.

CERTIFIED item indicated as "C" in drawings are traceable to material specification / grade only and identified by stamping /engraving /stenciling /painting

NOTE – 2.0 FOR FABRICATION OF VLH

2.1 MARKING, CUTTING AND PREPARETION OF SCA & VLH

2.2 Raw material shall be marked and cut to size by shearing , machining , saw cutting , flame or plasma (for SS materials) cutting. Flame cut edges shall be dressed by grinding. Gas cutting notches shall be filled up after grinding the notches smoothly by welding using compatible electrodes and ground before taking up for further fabrication.

2.3 Edge preparation of bottom end cover shall be done by machining only. Top end cover and compression plates shall be match drilled.

2.4 Lug plates shall be perpendicular to the body. Bottom end cover shall be welded maintaining perpendicularity and concentricity of hole with tube diameter. The rods bolt shall be welded with compression plate. Side suspension rods shall be set perpendicular to the lug plate and parallel to axis of pipe.

2.5 Top end cover shall be set in position after assembling the spring and compression plate. Free movement of compression plate shall be ensured before the welding of side suspension rods top end cover and top end cover shall be with pipe assembly. The eye hanger shall be welded exactly at center of top end cover.

2.6 Ensure that the spring is located centrally in the cage and not rubbing with tube wall during compression and expansion. Also ensure that the suspension rods move freely inside turn buckles.

2.7 Rating plate and indicator shall be fixed such that indicator reads zero on 56 mm compression of spring (for 80 series) and on 112 mm compression (160 mm series). The cut edge should be smoothly ground.

2.8 Heat treatment shall be done after shearing for P4 material t>12.5 mm and for P5 material t>10 mm. The requirement of preheat for gas cutting are as follows :

Carbon steel	t < = 50 mm	:	Nil
Carbon steel	t > 50 mm	:	100 ^{o} C. min.
Alloy steel (P4)	t < = 25 MM	:	NIL
ALLOY STEEL (P4)	t > 25 mm	:	150 ^{o} C
Alloy steel (P5)	ALL	:	150 ^{o} C
STAINLESS STEEL	NOT APPLICABLE		

2.9 Stress reliving for gas cut edges shall be as follows :

MATERIAL	THICKNESS	HEAT TREATMENT CYCLE
P1	> 50	600 ^{o} C / 650 ^{o} C for 30 minutes followed by

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20/8/19

	mm	Furnace cooling. (Alternatively , the cut surface ground /machined up to 3 mm to remove Heat affected area).
P4	> 16 mm	650 ^{0} C - 700 ^{0} C for 30 minutes. Cool.
P5	All	680 ^{0} C - 730 ^{0} C for 30 minutes. Cool.
SS (PLASMA)	Any	Not required

2.10 The raw material after cutting shall be identified with relevant Part No. and material Spec. / Grade transferred. Rating plate shall be fixed only after final assembly and painting. Pointers are to be welded to the spring plate as per drawing.

2.11 Top and bottom tie rods are to be machined to achieve the surface finish given in the drawing. Top and bottom tie rods are to be match drilled with coupling wherever two tie rods are involved. Bottom tie rod is to be match drilled with nut. Hole size shall be as per the drawing requirements.

2.12 Turn buckles shall be welded as per the drawing and drilled coaxial. Special care is to be taken to ensure alignment of pins and bushes.

2.13 Areas in accessible for painting in final assembled condition shall be painted during assembly stage itself.

2.14 The Following Tolerances shall apply

Hole center of lug plate	± 2mm
Hole center of top end cover	± 2 mm
Hole center of compression plate	± 2 mm
Distance between lug plate and top end cover	+5mm/-0 mm
Length of slot	+ 5 mm/-0 mm
Width of slot	+ 2 mm/-0 mm
Lateral shift of slot	± 2 mm
Overall length of tube	± 5 mm

2.15 NDE –The following welds shall be checked by LPI as per procedure BHE: NDT: PB: PT1.

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Lug plate and turn buckles welds : 100%

Top and bottom plate welds : 10%

2.16 All other welds shall be visually examined.

NOTE -03 For CLH

Ensure the following during fabrication, machining and assembly.

3.1 Stress relieving requirements shall be same as mentioned at point 2.8 and 2.9

3.2 Suitable templates shall be used for cutting the fixed /swing plate to the required configuration. Two plates shall be tack welded and drilled to get perfect alignment of holes. Match mark are to be made for further assembly and identified pair of plates only should be used in the assembly. Suitable fixture can be used to ensure alignment of holes.

3.3 The distance between the pivot pin and hole and eye bolts pin varies with each hanger i.e. WW value shall be taken from load movement chart and shall be marked on each assembly (on swinging plate).

3.4 Adjusting Plate assembly:

3.4.1 Ensure the center lines of hole and slot are in one line. There should be no taper in the slot.

3.4.2 Necessary care shall be taken while welding side plate and tapped hole plate, to ensure side plate are exactly parallel within 1mm after welding. After welding, the adjusting plate shall be drilled and tapped.

3.4.3 Ensure axis of hole of side plates and tapped plates are perpendicular to each other. Use suitable fixture.

3.4.4 The adjusting plate assembly shall be phosphated.

3.4.5 The spring tension rods is to be machined to achieve the surface finish and slot dimensions as given in the drawing. The threads are to be protected while welding before and after assembly. Chromium plating shall be carried to achieve a minimum thickness 0.06 mm.

3.4.6 During assembly, special care is to be taken to ensure alignment of pins and bushes. After positioning all the part, the arrow is to welded suitably to swing plate assembly so that it should be coincided with zero mark on adjusting plate assembly.

3.5 All load carrying weld shall be subjected to 100% LPI as per BHE: NDT: PB: PT1. All other weld shall be subjected to 100% visual examination and 10% LPI.

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3.6 All the dimension shall be as per drawing. Untoleranced dimension for fabrication shall be as under :

Length up to and including 750 mm	±2 mm
Length above 750 mm	±3 mm

NOTE – 04 TESTING OF VLH

4.1 Ensure that the moving/mating parts are free to rotate before testing.

4.2 Load test shall be carried out on a test rig consisting of Fabricated test stand, calibrated digital load and displacement indicator, calibrated load cells, hydraulic power pack and hydraulic cylinder. (The set up should be similar to that installed in BHEL). Check the calibration of test rig by comparing the deflection of master spring also.

4.3 Mount the Variable Load Hanger on test rig and compress the spring completely then decompress gradually. Again compress the spring and mark the position of pointer by locating the mid load (mentioned in the Load Displacement format Provided by BHEL). Now take the reading of loads at other points below and above the marked mid position and record. While recording the load, it should be ensured that reading should be taken while compressing the spring and not during decompressing.

4.4 If the readings of all the positions are found within limits, Punch mark the zero, mid and extreme positions and set the pointer at zero position (**if Cold & Hot values are not mentioned**) or on Cold position(**where Cold & Hot values are mentioned in details provided by BHEL**) and lock the hydraulic nut. Remove the Hanger from test rig and weld the top cover. Paint the final assembly and fix the travel scale. Drill the Spindle bolt together with Nut at specified position. Assemble the Turn Buckle and lock with split pin.

NOTE -05 FUNCTIONAL TESTING OF CLH (LISEGA) AT MANUFACTURER'S WORKS

Adjust the compression of the main and auxiliary spring such that the load tube is at centre position between the two lower connection blocks. At this point, both the load adjusting bolts should be equally engaged with bottom connection blocks (to be ensured by measuring the un engaged portion of load bolts). Also, both the Auxiliary springs should be equally compressed. Mount the CLH on the load pulling machine. The pulling tie rod and frame of the lifting machine should be sturdy enough to take the pulling load of respective constant load hanger. Release and remove the Guide bolt stop plates and compress the main spring by pulling the load tube approximately 125 mm for travel scale 150mm, 275 mm for travel scale 300 mm, 425 mm for travel scale 450 mm, 575 mm for travel scale 600 mm (measured by travel scale). There should not be any rubbing between Load tube and Upper Spring end plate. Also there should not be any jamming / unusual rubbing noise of mating components. Check the Nylon Stell rings, it

should not be rubbing with case assembly. Inspect by Pulling each assembly 3 to 4 times on the Pulling machine. If deviation is observed, dismantle the assembly and rectify the deviated component.

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BHEL HERP VARANASI
QUALITY PLAN

QULAITY PLAN FOR VARIABLE LOAD HANGERS (WITHOUT SPRING)

SL.NO.	COMPONENT	CHARACTERISTIC CHECKED	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS & ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
							P	W	V	
1.0	Raw Material : Plates : IS2062 Gr.A/B, Rods : SA 105, IS1875 CL.3, IS:961 Fe 540 HT-W, SA-193 B7, ERW Pipes : IS 1239 , Seamless pipes : SA 210 Gr. A1, SA 106 Gr.B	i. Chem. & Mech. Properties	Chem. & Mechanical test	1 sample per batch of material	Applicable material standards (as mentioned in component drawings)	T.C.	3	-	2	Raw material sources and T.C. requirements shall be as per standard No. RV/CLH-VLH/Procedure-001 REV-00
		ii. Soundness of Rod	Ultrasonic test	20% by BHEL, 100% by Vendor	Acceptance: SA 388; ASME Sec.VIII Div. 2 clause 3.3.4	T.C.	3	2		Only for Rod Dia/Thicknesses >50 mm. 100% UT by party (report) and 20% UT witness by TPI during PDI for each size Rod. If 20% of any particular Rod size quantity is less than 01 Whole Rod then Complete Rod Length to be checked.
2.0	Final Inspection after Assly.	i. D.P.Testing of welded joints	D.P.test	100% by Vendor , 10% random by BHEL	BHE:NDT:PB:PT-01	TC	3	2	-	Only External Welded Joints (Load Bearing) shall be checked by DP Test. During Final Inspection . 10% randomly selected samples shall be offered to inspector for DP Test witness.
		ii. Appearance and accuracy of Threads in different componets	Visual, Measurement with GO and NOGO Plug and Ring Gauges	100% by Vendor 10% random by BHEL	Threads to be free from chattering and should pass the GO, NOGO test	Inspection Report	3	2	-	Special Emphasis to be given to Turn Buckle Threads.
		iii. Zinc plating (wherever specified in the component drawing)	Measurement of coating thickness	100% by Vendor 10% random by BHEL	Drawing	Inspection Report	3	2	-	
		iv.Make of standard fasteners	Review of documents	100%			-	-	2	All the Std.fasteners like Nuts, Bolts, Screws should be make specified as per technical specn. of PO. All the fasteners shall be zinc plated and yellow passivated.
		iv.Dimensions and Threads Checking	Measurement	100% by Vendor 10 % by BHEL	Drawing.	Dimension Report	3	2	-	unspecified tolerances shall be maintained as per clause no. 2.14 of standard No. RV/CLH-VLH/Procedure-001 REV-00
		vii.Identification & Marking	PO No., VLH Type & Vendor Code is to be written by White Paint.	100%	-	Inspection Report	3	2	-	Vendor Code is to be written with white paint as per Writing Instruction for proper accountal of items.
		viii. Painting of casing	Paint shade and DFT	10% by BHEL on random basis	-	Insp.Report	3	-	1	Surface Preparation of casing must be done with Abrasive blast cleaning method to Sa 2-1/2 before painting. Apply one coat of Epoxy Zinc rich primer, (% vs = 35 min), dft = 40 micron minimum (Shade- Grey).

		PREPARED BY	APPROVED BY	LEGENDS : P = W = V = VERIFY 3 = VENDOR 2 = BHEL TPI 1 = BHEL
QP. NO.	RV-QP-LH-15 Rev-00			T.C. = TEST CERTIFICATE H.T. = HEAT TREATMENT
DATE	04-05-2019	SIGNATURE & DATE	SIGNATURE & DATE	
PG. NO.	1 OF 1			

Bharat Heavy Electricals Ltd.
BHEL, VARANASI/HERP, Varanasi

4/5/19

TECHNICAL SPECIFICATION FOR VARIABLE LOAD SPRING HANGERS (WITHOUT SPRING)

A) Scope of supply

This indent has been raised for fabrication and supply of variable load hanger (without spring, name plate, travel scale & hammer drive screw) in assembled condition for the qty mentioned against each item as per respective annexures. top plate is to be only light tack welded at two places at 180 degree with housing for easy transportation and to avoid misplacement. Pre-dispatch inspection will be carried out at party's works by BHEL representative as per QAP No. mentioned in the PO.

B) General Requirement

a. Vendor shall have major in-house manufacturing facilities and services. The details of these major in house manufacturing facilities and services are listed below :

1. Flame cutting, Saw cutting
2. MIG Welding sets
3. Qualified Welders
4. Covered shade for fabrication of Variable Load Hangers
5. Covered storage space for storage of VLH Springs.
6. Small lathes, Milling, Drilling machines for manufacturing of components like Centering Nut, Bottom socket, Spindle Bolt, Top Plate, Bottom plate, Hydraulic Locknut, Bearing Plate, Top & Bottom Tie rod, Spherical washer, Turn Buckle etc.
7. Abrasive blast cleaning facility
8. Separate covered Painting area
9. Level-II qualified D.P. personnel
10. Overhead / Gib crane to handle Load hangers weight > 50 Kg.

Some non-core and hazardous activities like Zinc plating may be outsourced.

C) Technical Requirement

1. Raw material should be used as per drawings.
2. Raw material should be procured form sources mentioned in enclosed Annexure-C. Carbon steel material of thickness less than 20 mm can however be procured from traders if tested on random basis in NABL accredited labs for each melt or each lot identified by the tagging incoming material physically and correlating the same tag with the material receipt no. recorded in the day receipt register. The lab test report shall be enclosed with the copy of test certificates.

3. Party may use equivalent materials as mentioned in the drawing. Use of any other material is not acceptable.
4. Dimensions and tolerances are to be maintained as per drawing and Procedure no. RV/CLH-VLH/Procedure-001 REV-00.
5. All welds are to be carried out by Gas Metal Arc Welding (GMAW) or MIG welding. SMAW or Manual Arc welding may be carried out in special cases with covered electrodes.
6. All welds should be as per sizes mentioned on the drawings. VLH with undersized welds shall not be accepted. The slots on VLH housings should be free from weld bead.
7. Procedure no. RV/CLH-VLH/Procedure-001 REV-00 should be strictly followed for raw material sources and process control in manufacturing and testing.
8. All the standard fasteners to be used shall be zinc plated and yellow chromatised. All standard fasteners shall be any of the following makes.

a) Sunderam fasteners (TVS brand name)
b) Laxmi Precision Screw, Rohtak (LPS Brand name)
c) Deepak Fasteners Ltd. , Ludhiana(DFL Brand name)
d) Boltmaster India Pvt. Ltd., Mumbai
e) Caparo Engg. India Ltd., Gurgaon
f) Sree Pavithra Industries, Chennai
g) J.J.Industries, Mumbai
h) KAYPEE Industries, Ludhiana
i) New Star Industries, Ludhiana
j) Mega Engg. Pvt. Ltd., Thane
k) Pioneer Nuts & Bolts Pvt Ltd, Ludhiana
l) President Engg. Works. Mumbai
m) Vardhman Industrial Fasteners
n) Shri Adinath Automotive, Rohtak
o) Lloyd Infrasystems, Ludhiana

9. For fixing the Name Plate, the size of Pop-Rivet should be chosen w.r.t. housing Thickness in a manner so that it should not be projected much inside housing to create hindrance for smooth movement of spring & Spring Plate.

D) Painting

Surface Preparation & surface profile : Abrasive blast cleaning to sa - 2 1/2, 35-50 microns.

Primer : One Coat of Epoxy Zinc rich primer as per IS 14589 Gr II, (% vs = 35 min), dft = 40 micron minimum.

Finish Paint : One Coat of Aliphatic acrylic polyurethene paint, (% vs = 40 min), dft = 30 micron minimum. Painting shade shall be Phirozi blue (IS:5 shade no.176)

E) Packing instruction:

items to be supplied in loose condition. threads should be protected with polythene sleeve & foam sheet in such a way that turn buckle movement should be restricted.