PQR (Turbine Spares)

	PQR Ref No: PQR/24-25/ Turbine Spares	**Date: 23.08.2024**
	Rev No: 00	**Review Date: 23.08.2024**
	PQR Revision Date:	
Sl. No.	**BHEL Terms**	**Supplier's ComplianceYES/NO**
1	**Offers are accepted from:**	
1	Only Manufacturer's Offers shall be considered for the Tender Enquiry.	
2	**Supplier shall give list of In-House Facilities:**	
2.a	Vendor shall have in-House necessary Manufacturing facilities required for manufacturing and supply of the item/s as per drng/spec..	
2.b	BHEL reserves right to visit the Works of the Manufacturer for Physical verification of the Manufacturing facilities (as declared by them) and assessment of their Quality systems during Technical Evaluation of the Offers.	
3	**Experience:**	
3.a	Bidders shall submit the necessary documents proving their Experience in Supplying same or similar nature items to any Power Plant equipment Manufacturer (OEM- Original Equipment Manufacturer) (worldwide or within India) in last three years from the date of Enquiry. Documentary evidances to be submitted in the form of Customer's Purchase Order copies / Matl.Acceptance Report and item drawings/specs.. Documentary evidences submitted shall strictly meet all the technical requirement of the NIT.	
3.b	BHEL reserves right to verify the details from the Bidder's customers based on Documents submitted as a part of past experience.BHEL may ask for other relevant documents in line with above to review the capacity and capability of vendor with respect to enquired items.	
4	**Manufacturing Process Plan:**	
4.a	Bidders shall submit detailed Manufacturing process Plan along with the Technical Offer.	
5	**Financial Capability:**	
5.a	**Turn Over:-** Turn over of Non-MSe vendors should be minimum 100% of tender value. Relaxation for MSe vendors/ Notified Start-UPs on turn over will be as per MSME guidelines. UDYAM certificate will be required for MSe status.	
5.b	Applicable only for Non-Mse vendors: Audited balance Sheet and Profit and Loss account Statement of last three consecutive year (with UDIN) required along with part-1 bid. Or A CA Certified Consolidated summary (with UDIN) for last 3 consecutive years having annual turn over and Profit and Loss to be enclosed along with Part-1 bid . For Vendors having Turn over less than 1 crore in any of the financial year, CA certified Financial Turn over and Profit Loss (with UDIN) may be accepted for that year only.	
6	After placement of Purchase Order, Vendor shall submit Material Test Certificate before dispatching the Material to BHEL, for review and Dispatch clearance.	

Note-1: Non Submission of the above requested documents/non compliance to the above points will result in rejection of the Offers without further Notice/Intimation to the Bidder and no correspondance will be entertained at later date.

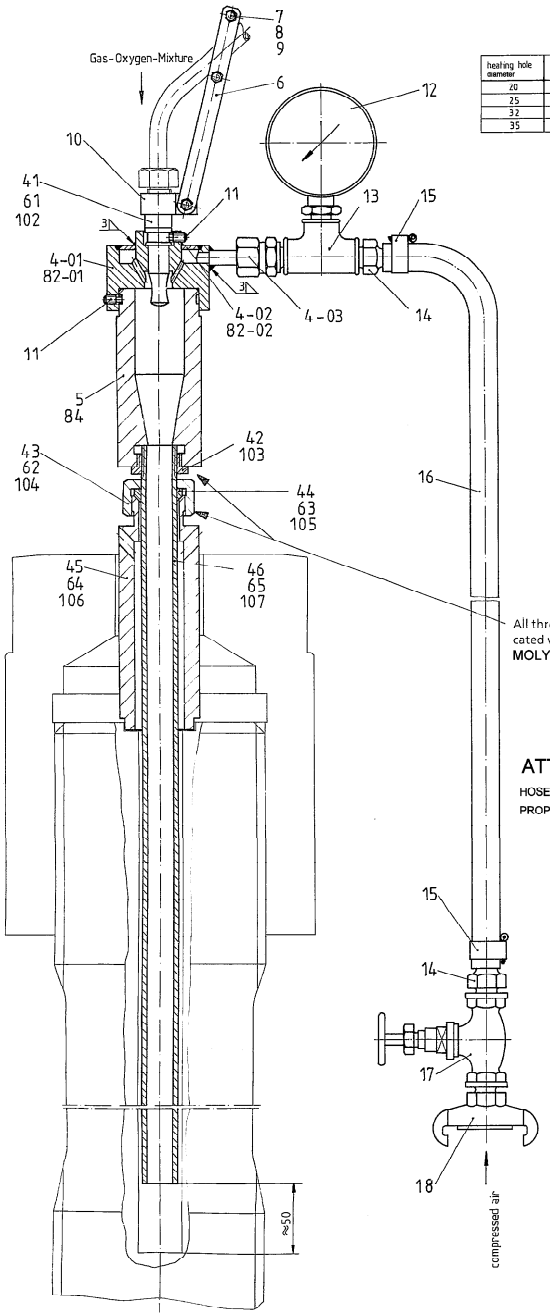
Note-2: "Similar items" means items having same/similar manufacturing process,similar nature of use of item as that of enquired items etc.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

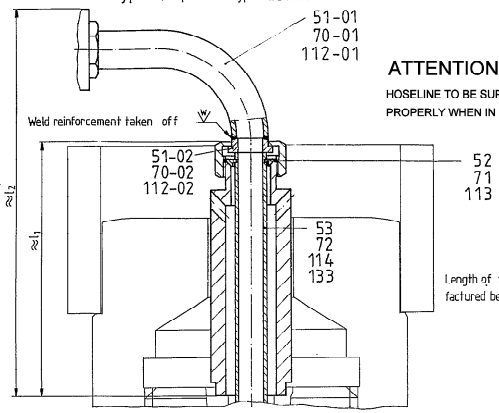
DRG. NO. 1 12015 56600

Type 1



heating hole diameter	l_1	l_2
20	105	186
25	142	220
32	142	245
35	184	295

Type 2 (all parts of type 1 are included)

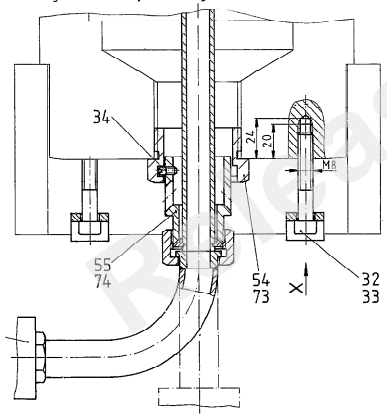


Length of the metal hose manufactured before starting to heat.

ATTENTION!
HOSELINE TO BE SUPPORTED PROPERLY WHEN IN USE

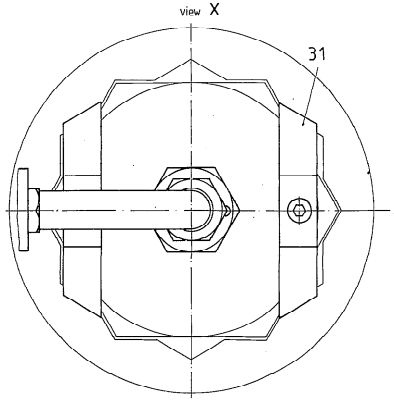
Type 3 (all parts of type 2 and also type 1 are included)

Heating from below only for heating hole Φ20 and 25mm

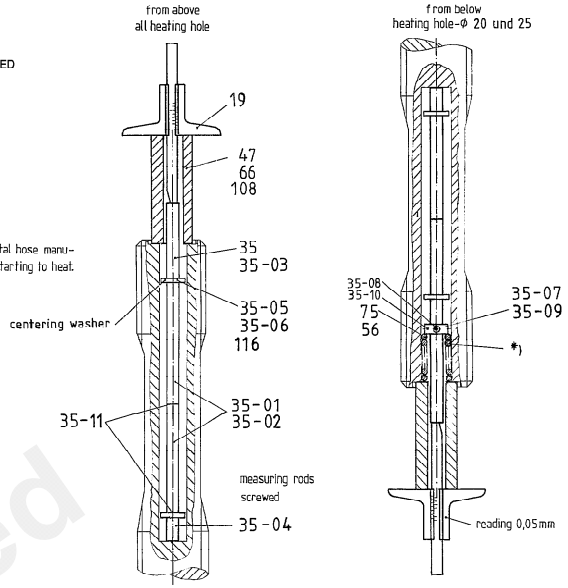


ATTENTION!
HOSELINE TO BE SUPPORTED PROPERLY WHEN IN USE

view X



Using of the measuring instruments



Part 36 magnet lifter for the measuring rods is not shown

*) The spring is to prestressed such that the gauge rod is pressed to the bottom of the hole the sleeve is resting on.

Parts 3, 81 and 101 are boxes for the parts packing.
Description part 28 and tables of contents part 29 are inserted in the boxes.

NOTE:

1) This drawing covers the broad guideline on design, manufacture & supply of stud heating and mesuring device . Scope of supply covers associated compressed air piping including fine regulating valve, pressure gauge and pipe fittings. A measuring device for measuring the extension of stud/bolt is also included in the scope of supply. Scope of supply shall be as per Type-3 which shall include all the parts specified in Type-2 & Type-1 along with items specified in Type-3 as shown in this drawing.
(For detail scope of supply and part item details refer sheet no. 2 to 13 of this drawing)
2) Design should ensure that vent holes for release of hot gases in outer tube remain open to atmosphere in all operating condition.
3) This heating device is a portable unit. Heating should be possible in any of the stud in assembled condition.
4) The arrangement shown in this drawing is for reference purpose. The sole responsibility of mechanical design rests with supplier.
5) Certificate of compliance to be provided by supplier

BHEL MATERIAL CODE: W90312015020

GRADE OF UNTOL.DIM
M/CG.- AA0230208
WELDING-AA0621104
GAS CUTTING-T3-AA0621101

REV	DATE	ALTERED / CHECKED

C.B.O.M. No. | STATUS OF DRG

AGENCY DEPT	NAME	SIGN	DATE

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STEAM TURBINE

BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	DINESH	-SD-	21.03.2017
CHD	ALOK SINGH	-SD-	21.03.2017
APPD	D.K.RAY	-SD-	21.03.2017

NO. OF VAR: –

DEPT STE
CODE 4011
SCALE N.T.S
WEIGHT (KG) 70.0
REF. TO ASSY. DRG.
ITEM No.
NO. OF ITEMS: –

TITLE: STUD HEATING AND MEASURING DEVICE
CARD CODE
DRAWING NO. 1-12015-56600
SHEET No. 01 | No. OF SHEETS 13

A1 SIZE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600

HEIZEINRICHTUNG - 20*25 - (abgeleitet von TUN 01440.2)
*BOLT HEATING DEVICE - 20*25 - (deduced of TUN 01440.2)*

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
			GEMEINSAME TEILE FÜR HEIZBOHRUNG 20, 25 und 32 *COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32*			
3-00	1	ST *PIECE*	KASTEN *BOX*		(47117-0055) *	ALUMINIUM
4-00	2	ST *PIECE*	MISCHKOPF *MIXING HEAD*	20*25	TUN01440.2T4	
4-01	2	ST *PIECE*	MISCHKOPF *MIXING HEAD*	D=58*45;GR0ESSE:20-25. *D=58*45;SIZE:20-25.*	4760101	15MO3
4-02	2	ST *PIECE*	SCHEIBE *WASHER*	A26,5*46*2	MUN607.2/1	15MO3
4-03	2	ST *PIECE*	VERSCHRAUBUNG *UNION*	B8-10*1,5	KUN675.03	C22.8
5-00	2	ST *PIECE*	HUELSE *SLEEVE*	D=46*100-M20*1,5	3580705	10CRMO910
6-00	4	ST *PIECE*	LASCHE *LINK*		4471104 *	ST50K
7-00	6	ST *PIECE*	ZYLINDERSCHRAUBE *SOCKET HEAD SCREW*	M5*30K	DIN7984 *	
8-00	6	ST *PIECE*	SECHSKANTMUTTER *HEXAGON NUT*	M5	IS04032 *	8
9-00	6	ST *PIECE*	FEDERRING *SPRING RING*	A5	DIN128 *	FEDERSTAHL *SPRING STEEL*
10-00	2	ST *PIECE*	KLEMMSTUECK *CLAMPING SHIM*		3957101 *	ST50K
11-00	6	ST *PIECE*	GEWINDESTIFT *HEX. SOCKET SET SCREW*	M5*10-0SPAE	DIN915 *	45H
12-00	2	ST *PIECE*	DRUCKMESSGERAET *PRESS. MEASUR. DEVICE*	075AG6316	DIN16063 *	
13-00	2	ST *PIECE*	T-STUECK *T-PIECE*	130-1/4	DIN2950 *	GTW-35-O4
14-00	4	ST *PIECE*	GEWINDETUELLE *THREADED SLEEVE*	R1/4IN	47111-0055 *	ST/ZN
15-00	4	ST *PIECE*	SCHLAUCHBINDER *HOSE CLIP*		47106-0026 *	ST
16-00	2	ST *PIECE*	SCHLAUCH *HOSE*	RT-A9*900	DIN8541 *	GI+TEX-EINLAGE
17-00	2	ST *PIECE*	DURCHGANGSVENTIL *VALVE*	V1/4	DIN3512 *	MS-ROH
18-00	2	ST *PIECE*	KUPPLUNG *COUPLING*	VB1/4	DIN3481	TEMPERGUSS *MALLEABLE CAST IRON*
19-00	1	ST *PIECE*	TIEFENMASS *DEPTH GAGE*	C150Form A	DIN862	ST/MCR
28-00	1	ST *PIECE*	BESCHREIBUNG *DESCRIPTION*		M-TN03370	PAPIER *PAPER*

Index	Datum *date*	Name *name*	Änderungsbeschreibung *description of change*
			Pos. 40 - 40-04 hinzu.
			Pos. 64: Mat. Geändert von 24CRMO5 nach 1.4762.
			Pos. 46,51-01,51-02,65,70-01,70-02: Mat. Geändert von X22CRMOV121 nach 1.4571.
			Pos. 42,43,62: Mat. Geändert von 24CRMO5 nach 10CRMO910.
			Pos. 6,10: Mat. Geändert von C45K nach ST50K; Pos. 35-09: von 115CRV3 nach ST50K.
			Pos. 35-01 - 35-07: Mat. Geändert von 15CRMOV3 nach 9s 20K.
			Pos. 4-03,44,47,52,63,66,71: Mat. Geändert von X22CRMOV121 nach 10CRMO910.
a	06.11.98	Habermann	Englische Übersetzung hinzugefügt.

Entst. aus / orig. of — Grund / reason

	Datum *date*	Name *name*	Maßstab *scale*	UAS *doc.key*
GEZEICH. DRAWN.	26.09.97	Springmann	**Heizeinrichtung** HEATING DEVICE	Inhaltskennzeichen Code
BEARB. COORD.	26.09.97	Springmann		
GEPRÜFT CHECKED	29.09.97	Habermann		

SIEMENS Energieerzeugung KWU — Form 44, Z-Sy. 14, Spra. — **7914-014400/001** — Index a — Blatt *sheet* 1 von *of* 4 — Ges.Gew. *total weight* in kg - — MF

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
29-00	1	ST *PIECE*	INHALTSVERZEICHNIS *INDEX*		M-TN03371	PAPIER *PAPER*
35-00	1	ST *PIECE*	MESSEINSATZ *MEASUREMENT INSERT*		S-TUN01440.2	
35-01	4	ST *PIECE*	MESSSTAB *MEASURING ROD*	200	47117-0058	9s 20K
35-02	3	ST *PIECE*	MESSSTAB *MEASURING ROD*	100	47117-0058	9s 20K
35-03	1	ST *PIECE*	MESSSTAB *MEASURING ROD*		47117-0060	9s 20K
35-04	1	ST *PIECE*	MESSSTAB *MEASURING ROD*		47117-0059	9s 20K
35-05	2	ST *PIECE*	SCHEIBE *WASHER*	B6,5*19,5*4	MUN607.2/1	9s 20K
35-06	2	ST *PIECE*	SCHEIBE *WASHER*	B6,5*24,5*4	MUN607.2/1	9s 20K
35-07	1	ST *PIECE*	STELLRING *SETTING RING*		47117-0077	9s 20K
35-08	1	ST *PIECE*	GEWINDESTIFT *HEX. SOCKET SET SCREW*	M3*4	DIN913	45H
35-09	1	ST *PIECE*	STELLRING *SETTING RING*		47117-0078	ST50K
35-10	1	ST *PIECE*	GEWINDESTIFT *HEX. SOCKET SET SCREW*	M4*5-0SPAE	DIN914	45H
35-11	7	ST *PIECE*	GEWINDESTIFT *HEX. SOCKET SET SCREW*	M6*25-0SPAE	DIN914	45H
36-00	1	ST *PIECE*	MAGNETHEBER *MAGNET PIPETTE*	67950-3000	0 *	
38-00	2	ST *PIECE*	HANDGRIFFE *BURNER HANDLES*	MESSER-GRIESHEIM	STAR 2000	Pos. nicht in der Zeichn. *Position not in the drawing*
39-00	2	ST *PIECE*	SPITZEN 9-14mm *BURNER NOZZLE 9-14mm*	MESSER-GRIESHEIM	STAR, Typ 210-A	Pos. nicht in der Zeichn. *Position not in the drawing*
40-00	4	ST *PIECE*	SCHLAUCHVERBINDUNG *HOSE CONNECTION*	MESSER-GRIESHEIM	DIN8542	Pos. nicht in der Zeichn. *Position not in the drawing*
40-01	2	ST *PIECE*	ÜBERWURFMUTTER G1/4" *COUPLING NUT G1/4"*	MESSER-GRIESHEIM	DIN8542	Pos. nicht in der Zeichn. *Position not in the drawing*
40-02	2	ST *PIECE*	TÜLLE DN 6, 1/4" *BUSHING DN 6, 1/4"*	MESSER-GRIESHEIM	DIN8542	Pos. nicht in der Zeichn. *Position not in the drawing*
40-03	2	ST *PIECE*	ÜBERWURFMUTTER G3/8"links *COUPLING NUT G3/8" left*	MESSER-GRIESHEIM	DIN8542	Pos. nicht in der Zeichn. *Position not in the drawing*
40-04	2	ST *PIECE*	TÜLLE DN 9, 3/8" *BUSHING DN 9, 3/8"*	MESSER-GRIESHEIM	DIN8542	Pos. nicht in der Zeichn. *Position not in the drawing*

(Revision block and title block as above: Heizeinrichtung HEATING DEVICE, 7914-014400/001, Index a, Blatt 2 von 4)

ZUSÄTZLICHE TEILE FUER HEIZBOHRUNG 20
ADDITIONAL PARTS FOR HEATING BORE (HOLE) 20

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
41-00	2	ST *PIECE*	MUNDSTÜCK *MOUTH PIECE*		4810201	CU
42-00	2	ST *PIECE*	REDUZIERSTÜCK *REDUCER PIECE*	M20*1,5->M16*1,5	6080201	10CRMO910
43-00	2	ST *PIECE*	ÜBERWURFMUTTER *LOCK NUT*	M24*1,5	4818101	10CRMO910
44-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*		6094723	10CRMO910
45-00	2	ST *PIECE*	HÜLSE *SLEEVE*	D=34*94-M24*1,5	3580728	1.4571
46-00	4	ST *PIECE*	ROHR *PIPE (GAS HEATER)*	D=16*2,6*440;EINS.=M16*1,5	3580708	1.4571
47-00	1	ST *PIECE*	HÜLSE *SLEEVE*	D=34,5*80	47114-0054	10CRMO910
51-00	2	ST *PIECE*	BOGEN *BEND*	20*	TUN01440.2T51	
51-01	2	ST *PIECE*	ROHRBOGEN *PIPE BOW*		6133704	1.4571
51-02	2	ST *PIECE*	BUCHSE *BUSHING*		1372309	1.4571
52-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*		6094727	10CRMO910

(Revision block and title block as above: Heizeinrichtung HEATING DEVICE, 7914-014400/001, Index a, Blatt 3 von 4)

ZUSÄTZLICHE TEILE FUER HEIZBOHRUNG 25
ADDITIONAL PARTS FOR HEATING BORE (HOLE) 25

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
61-00	2	ST *PIECE*	MUNDSTÜCK *MOUTH PIECE*		4810203	CU
62-00	2	ST *PIECE*	ÜBERWURFMUTTER *LOCK NUT*	M30*1,5	KUN606.02	10CRMO910
63-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*	D=27/20,5/21,5;ZWEITEILIG *D=27/20,5/21,5;TWO PART*	6094724	10CRMO910
64-00	2	ST *PIECE*	HÜLSE *SLEEVE*	D=45*132-M30*1,5	3580729	1.4762
65-00	4	ST *PIECE*	ROHR *PIPE (GAS HEATER)*	D=20*2,5*460;EINS.=M20*1,5	3580704	1.4571
66-00	1	ST *PIECE*	HÜLSE *SLEEVE*	D=39*110	3580727	10CRMO910
70-00	2	ST *PIECE*	BOGEN *BEND*	*25*	TUN01440.2T70	
70-01	2	ST *PIECE*	ROHRBOGEN *PIPE BOW*		6133703	1.4571
70-02	2	ST *PIECE*	BUCHSE *BUSHING*		1372307	1.4571
71-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*		6094728	10CRMO910

***) Position kann in Einzelfällen durch Lieferantenentscheidung von der Vorgabe abweichen.**
Position can differ from the handicap in individual cases by supplier decision.

– Als Grundlage für die Fertigung bei der *Fa. Schweißtechnik GmbH* in Essen (Lieferanten-Nr.:16866) gilt die Zeichnung: **TUN 01440.2 - 20*25*32*35, Heizeinrichtung für Teilfugenschrauben.**
The drawing number: ***TUN 01440.2 - 20*25*32*35*, bold heating device** *is valid as basis for the production with Company Schweißtechnik in Essen (suppliers no 16866).*

– Zum Lieferumfang der Heizeinrichtung 20*25 gehört die **Meßvorrichtung 7914-014400/003** (abgeleitet von der TUN 01432.22), die dem Kasten- bzw. Kofferinhalt beizustellen ist.
*The measuring device 7914-014400/003 (deduced of 01432.22) is part of the extent of supply of the bolt heating device 20*25, it have to be provided for this box or suitcase contents.*

(Revision block and title block as above: Heizeinrichtung HEATING DEVICE, 7914-014400/001, Index a, Blatt 4 von 4)

HEIZEINRICHTUNG - *32 - (abgeleitet von TUN 01440.2)
*BOLT HEATING DEVICE - *32 - (deduced of TUN 01440.2)*

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
			ZUSÄTZLICHE TEILE FUER HEIZBOHRUNG 32 *ADDITIONAL PARTS FOR HEATING BORE (HOLE) 32*			
	1	ST *PIECE*	KASTEN *BOX*	NUR FÜR *32* ZUSATZTEILE *ONLY FOR ADDITIONAL PARTS *32**	(47117-0055) *	Aluminium
82-00	2	ST *PIECE*	MISCHKOPF *MIXING HEAD*	*32*	TUN01440.2T82	
82-01	2	ST *PIECE*	MISCHKOPF *MIXING HEAD*	D=64*55;GR0ESSE:32 *D=64*55;SIZE:32*	4760102	15MO3
82-02	2	ST *PIECE*	SCHEIBE *WASHER*	A31*51*4	MUN607.2/1	15MO3
82-03	2	ST *PIECE*	VERSCHRAUBUNG *UNION*	B8-10*1,5	KUN675.03	C22.8
83-00	6	ST *PIECE*	GEWINDESTIFT *HEX. SOCKET SET SCREW*	M5*10-0 SPAE	DIN915 *	45H
84-00	2	ST *PIECE*	HUELSE *SLEEVE*	D=52*110-M33*1,5	3580716	10CRMO910
102-00	2	ST *PIECE*	MUNDSTÜCK *MOUTH PIECE*		4810202	CU
103-00	2	ST *PIECE*	REDUZIERSTÜCK *REDUCER PIECE*	M24*1,5->M33*1,5	6080203	10CRMO910
104-00	2	ST *PIECE*	ÜBERWURFMUTTER *LOCK NUT*	M36*1,5	4818102	10CRMO910
105-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*	D=33/25,6/26,5;ZWEITEILIG *D=33/25,6/26,5;TWO-PART*	6094725	10CRMO910
106-00	2	ST *PIECE*	HUELSE *SLEEVE*	D=45*134-M36*1,5	3580730	1.4762
107-00	4	ST *PIECE*	ROHR *PIPE (GAS HEATER)*		3580711	1.4571
108-00	1	ST *PIECE*	HUELSE *SLEEVE*	D=41,5*120	3580715	10CRMO910
112-00	2	ST *PIECE*	BOGEN *BEND*	*32	TUN01440.2T112	
112-01	2	ST *PIECE*	ROHRBOGEN *PIPE BOW*		6133706	1.4571
112-02	2	ST *PIECE*	BUCHSE *BUSHING*		1372311	1.4571
113-00	2	ST *PIECE*	KLEMMRING *CLAMPING RING*		6094729	10CRMO910
116-00	2	ST *PIECE*	SCHEIBE *WASHER*	B6,5*31,5*4	MUN607.2/1	9s 20K
119-00	2	ST *PIECE*	SPITZEN 14-20mm *BURNER NOZZLE 14-20mm*	MESSER-GRIESHEIM	STAR, Typ 210-A	Pos. nicht in der Zeichn. *Position not in the drawing*

***) Position kann in Einzelfällen durch Lieferantenentscheidung von der Vorgabe abweichen.**
Position can differ from the handicap in individual cases by supplier decision.

– Die Heizeinrichtung *32 kann nur gemeinsam mit der Heizeinrichtung 20*25 (7914-014400/001) bestellt werden, da alle für den Betriebseinsatz benötigten Teile dort enthalten sind.
The ***heating device *32*** *can be ordered only together with the* ***heating device 20*25*** *(7914-014400/001), since all parts needed for operation use are contained there.*

Index	Datum *date*	Name *name*	Änderungsbeschreibung *description of change*
			Pos. 103,104: Mat. Geändert von 24CRMO5 nach 10CRMO910, Pos. 106 nach 1.4762.
			Pos. 107,112-1,112-2: Mat. Geändert von X6CRNITI1810 nach 1.4571.
			Pos. 84,105,108,113: Mat. Geändert von X22CRMOV121 nach 10CRMO910.
a	06.11.98	Habermann	Englische Übersetzung hinzugefügt.

Entst. aus / orig. of — Grund / reason

	Datum *date*	Name *name*	Maßstab *scale*	UAS *doc.key*
GEZEICH. DRAWN.	26.09.97	Springmann	**Heizeinrichtung** HEATING DEVICE	Inhaltskennzeichen Code
BEARB. COORD.	26.09.97	Springmann		
GEPRÜFT CHECKED	29.09.97	Habermann		

SIEMENS Energieerzeugung KWU — Form 44, Z-Sy. 14, Spra. — **7914-014400/002** — Index a — Blatt *sheet* 1 von *of* 1 — Ges.Gew. *total weight* in kg - — MF

MEßVORRICHTUNG (abgeleitet von 014180)
MEASURING EQUIPMENT (deduced of 014180)

Pos.	A Q	E Unity	Benennung *Name*	Abmessung *Dimension*	Zeichnungsnr. *Drawing number*	Material
			Zusätzliche Teile für Meßvorrichtung Dehnschrauben 240/260 ***ADDITIONAL PARTS FOR MEASURING EQUIPMENT 240/260***			
4-00	1	ST *PIECE*	HUELSE *SLEEVE*		3580726	115CRV3
9-00	1	ST *PIECE*	BESCHREIBUNG *DESCRIPTION*	M-TN02702		PAPIER *PAPER*
10-00	1	ST *PIECE*	MESSSTAB *MEASURING ROD*	L=260	7561006	115CRV3
11-00	1	ST *PIECE*	MESSSTAB *MEASURING ROD*	L=240	7561006	115CRV3

– Als Grundlage für die Fertigung bei der Fa. Schweißtechnik GmbH in Essen (Lieferanten-Nr.:16866) gilt die Zeichnung: **TUN 01432.22-7,5; Meßvorrichtung.**

The drawing number: ***TUN 01432.22-7,5 measuring device*** *is valid as basis for the production with Company Schweißtechnik GmbH in Essen (suppliers no 16866).*

– Die Meßvorrichtung 240/260 wird gemeinsam mit der Heizeinrichtung 20*25 (7914-014400/001) bestellt, und ist dem Kasten- bzw. Kofferinhalt beizufügen.

*The measuring device 240/260 is ordered together with the bolt heating device 20*25 (7914-014400/001) and it is to enclose box or suitcase contents with this.*

Index	Datum *date*	Name *name*	Änderungsbeschreibung *description of change*
a	06.11.98	Habermann	Englische Übersetzung hinzugefügt.

Entst. aus / orig. of — Grund / reason

	Datum *date*	Name *name*	Maßstab *scale*	UAS *doc.key*
GEZEICH. DRAWN.	26.09.97	Springmann	**Messvorrichtung** MEASURING EQUIPMENT	Inhaltskennzeichen Code
BEARB. COORD.	26.09.97	Springmann		
GEPRÜFT CHECKED	29.09.97	Habermann		

SIEMENS Energieerzeugung KWU — Form 44, Z-Sy. 14, Spra. — **7914-014400/003** — Index a — Blatt *sheet* 1 von *of* 1 — Ges.Gew. *total weight* in kg - — MF

INVENTORY NO. | SIGN AND DATE | REF. DRG. NO. TUN 01440.2 | TIN NO. PSK031K996

GRADE OF UNTOL.DIM	C.B.O.M. No.	STATUS OF DRG U
M/CG.- AA0230208	AGREED DEPT / NAME / SIGN	DATE
WELDING-AA0621104		
~~GAS CUTTING-'T3'AA0621101~~		

REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STEAM TURBINE

BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	DINESH	-SD-	21.03.2017
CHD	DINESH	-SD-	21.03.2017
APPD	D.K.RAY	-SD-	21.03.2017

NO. OF VAR — 73 74

DEPT STE		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011		N.T.S	70.0			— 75 77

TITLE : **STUD HEATING AND MEASURING DEVICE**

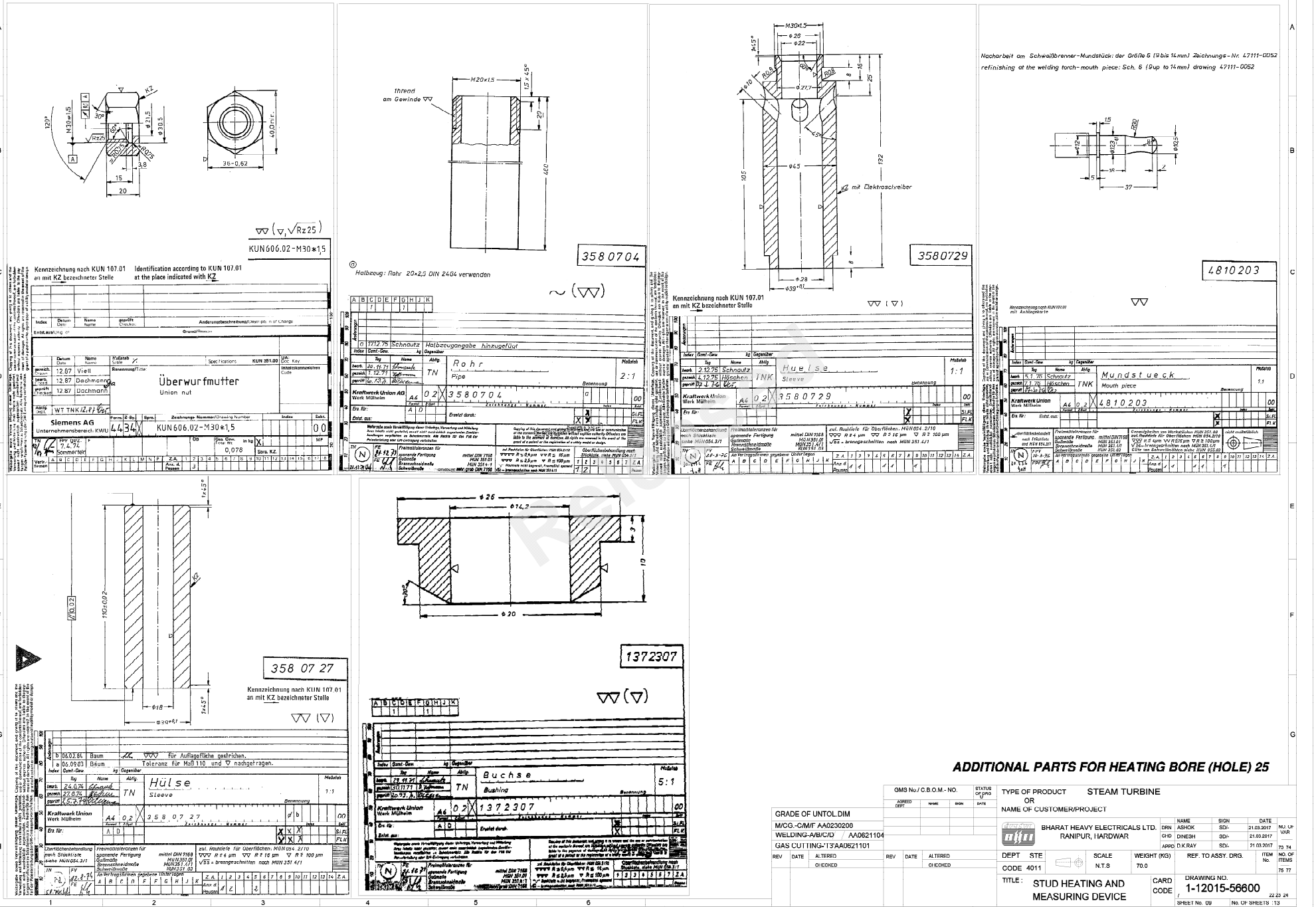
CARD CODE 7 — DRAWING NO. 1-12015-56600 — 22 23 24

SHEET No.02 — No. OF SHEETS :13

A1 SIZE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)



ADDITIONAL PARTS FOR HEATING BORE (HOLE) 25

GMS No./ C.B.O.M.- NO.		STATUS OF DRG	
AGREED DEPT	NAME	SIGN	DATE
GRADE OF UNTOL.DIM			
M/CG.-C/M/F AA0230206			
WELDING-A/B/C/D AA0621104			
GAS CUTTING-T3 AA0621101			
REV	DATE	ALTERED CHECKED	

TYPE OF PRODUCT STEAM TURBINE
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

DEPT STE
CODE 4011
SCALE N.T.S
WEIGHT (KG) 70.0
REF. TO ASSY. DRG.
ITEM No.
NO. OF ITEMS 75 77

TITLE : STUD HEATING AND MEASURING DEVICE

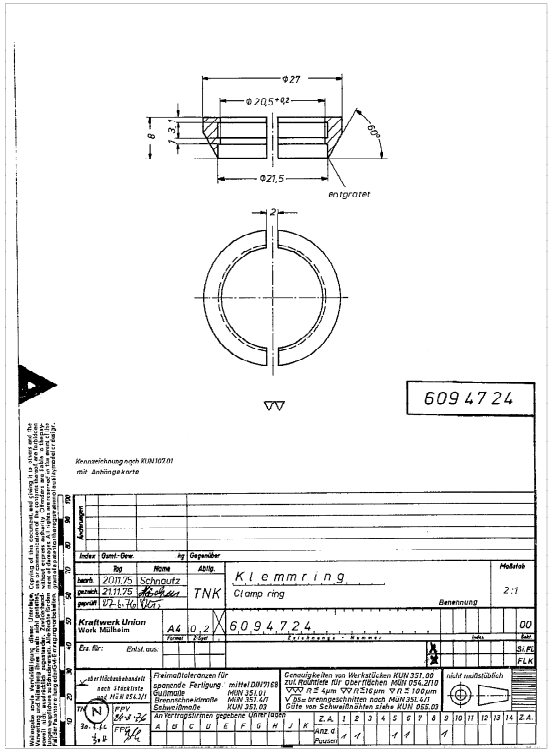
CARD CODE
DRAWING NO. 1-12015-56600
SHEET No. 09 No. OF SHEETS 13

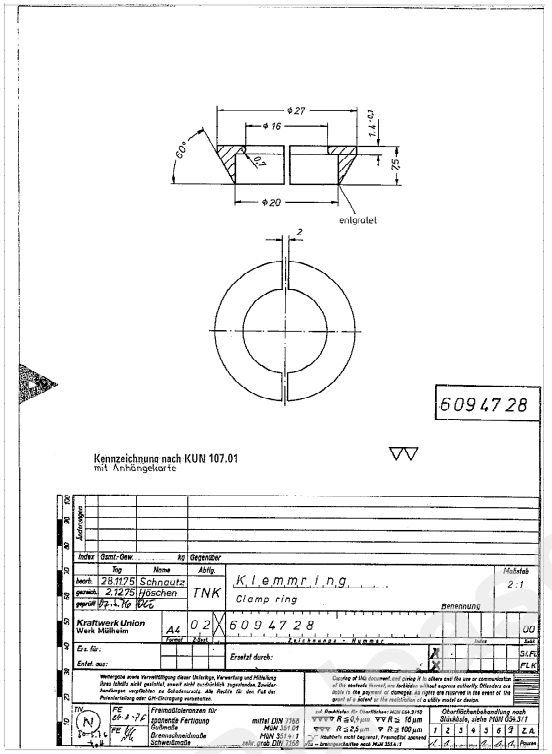
A1 SIZE

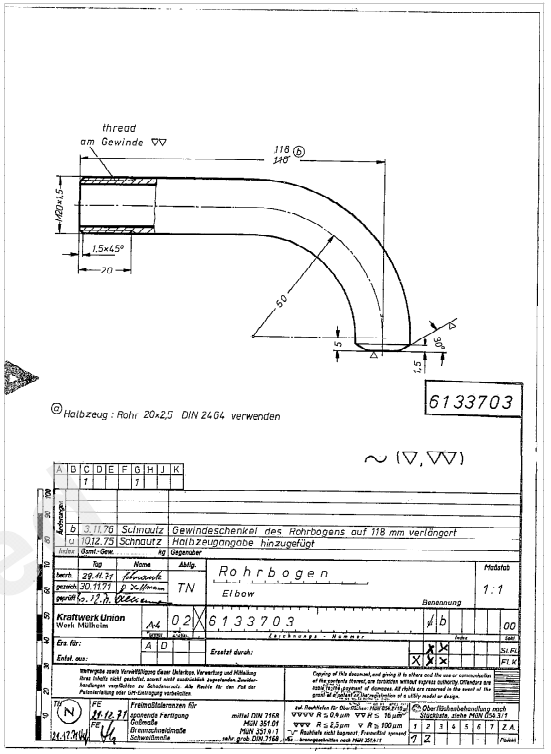
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600







ADDITIONAL PARTS FOR HEATING BORE (HOLE) 25

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WELDING-A/B/C/D / AA0621104	
GAS CUTTING-'13'AA0621101	
GMS No./ C.B.O.M.- NO.	STATUS OF DRG
TYPE OF PRODUCT	STEAM TURBINE
OR NAME OF CUSTOMER/PROJECT	
BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR	
DEPT STE	
CODE 4011	
SCALE N.T.S	
WEIGHT (KG) 70.0	
REF. TO ASSY. DRG.	
ITEM No.	
NO. OF ITEMS 75 77	
TITLE : STUD HEATING AND MEASURING DEVICE	
CARD CODE	
DRAWING NO. 1-12015-56600	
SHEET No. 10	No. OF SHEETS : 13

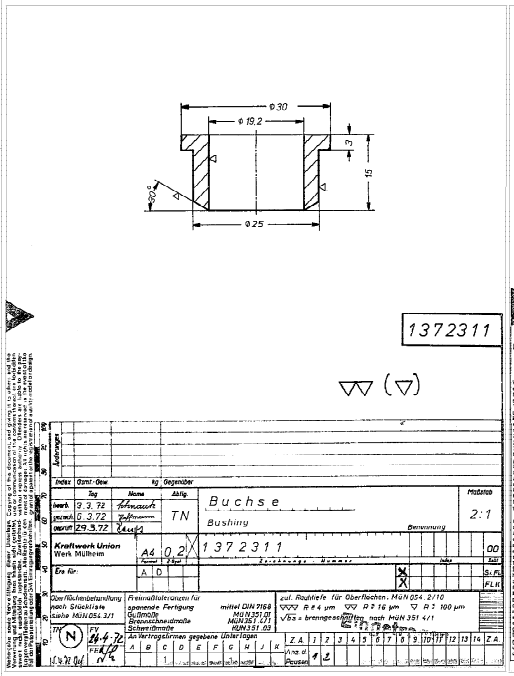
	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

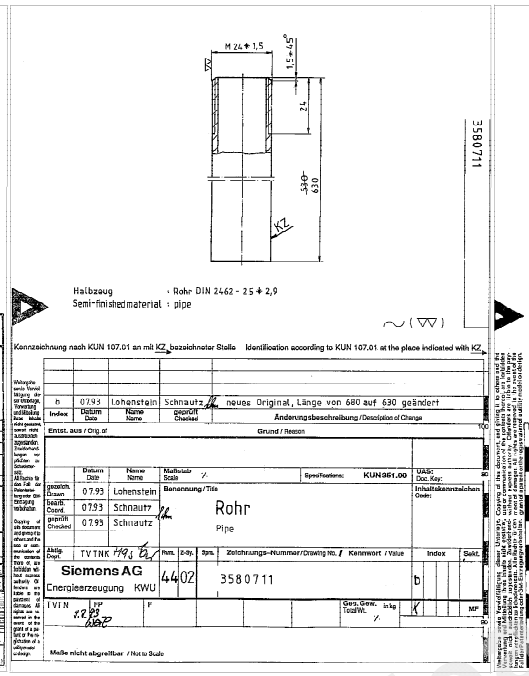
REV	DATE	ALTERED / CHECKED
REV	DATE	ALTERED / CHECKED
REV	DATE	ALTERED / CHECKED

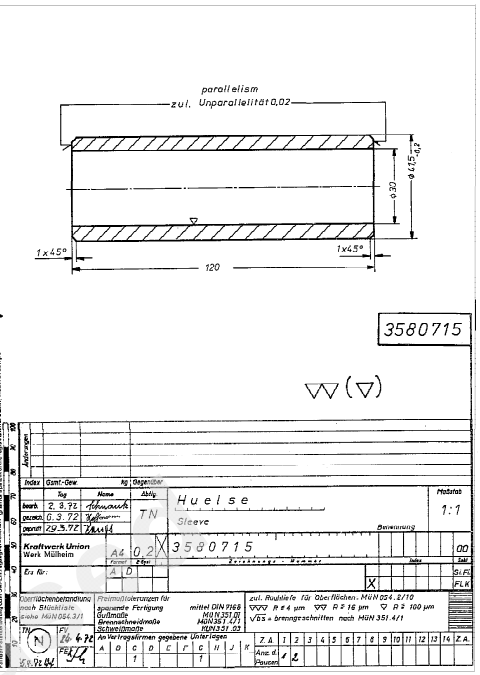
A1 SIZE

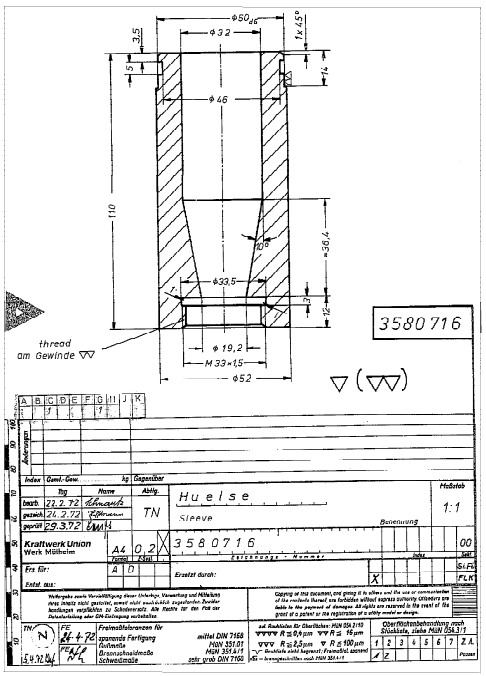
FIRST ANGLE PROJECTION

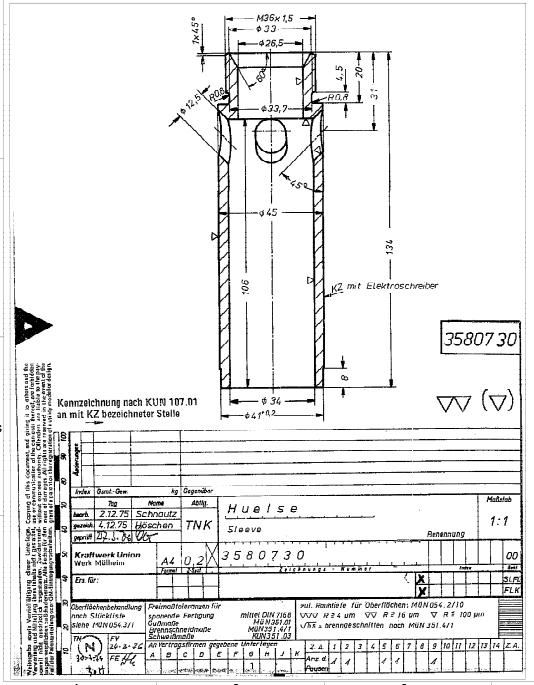
(ALL DIMENSIONS ARE IN mm)

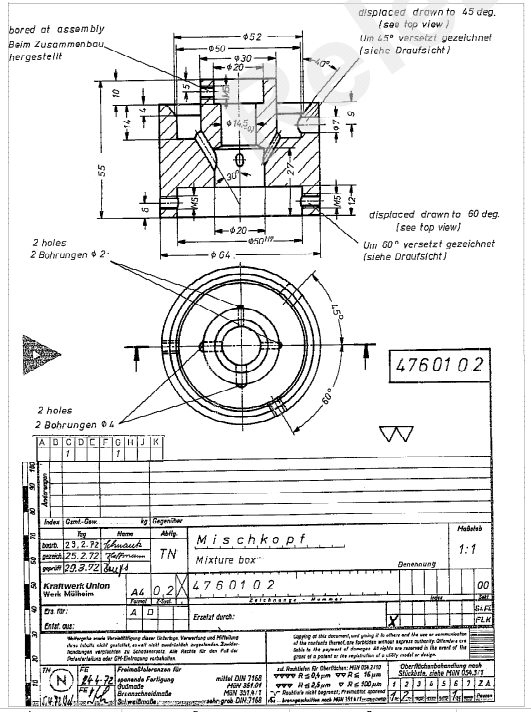












ADDITIONAL PARTS FOR HEATING BORE (HOLE) 32

GRADE OF UNTOL DIM				GMS No./ C.B.O.M.- NO.			STATUS OF DRG
M/CG.-C/M/F AA0230208				AGREED DEPT	NAME	SIGN	DATE
WELDING-A/B/C/D AA0621104							
GAS CUTTING-'T3'AA0621101							
REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED		

TYPE OF PRODUCT STEAM TURBINE
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D K RAY	SD/-	21.03.2017

NO. OF VAR 73 74

DEPT STE
CODE 4011
SCALE N.I.S
WEIGHT (KG) 70.0
REF. TO ASSY. DRG.
ITEM No.
NO. OF ITEMS 75 77

TITLE : STUD HEATING AND MEASURING DEVICE

CARD CODE 7
DRAWING NO. 1-12015-56600 22 23 24
SHEET No. 11 No. OF SHEETS 13

AI SIZE

<PART NUMBER> <PART REVISION NUMBER>

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600

BHARAT HEAVY ELECTRICALS LIMITED.

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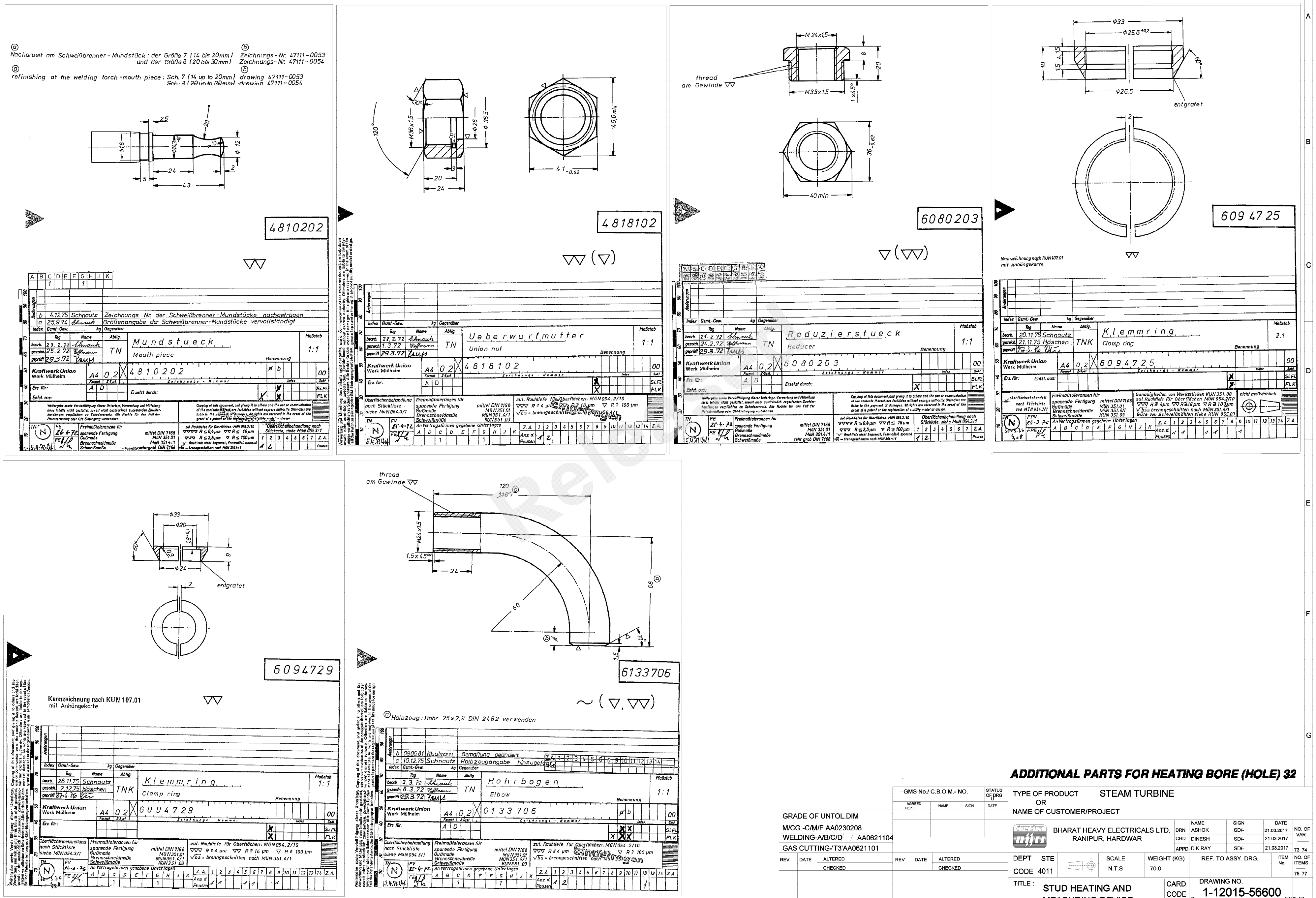
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY



ADDITIONAL PARTS FOR HEATING BORE (HOLE) 32

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STEAM TURBINE
GRADE OF UNTOL.DIM	
M/CG.-C/M/F	AA0230208
WELDING-A/B/C/D	AA0621104
GAS CUTTING-'T3'	AA0621101

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

DEPT	STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.
CODE	4011	N.T.S	70.0	

TITLE: STUD HEATING AND MEASURING DEVICE

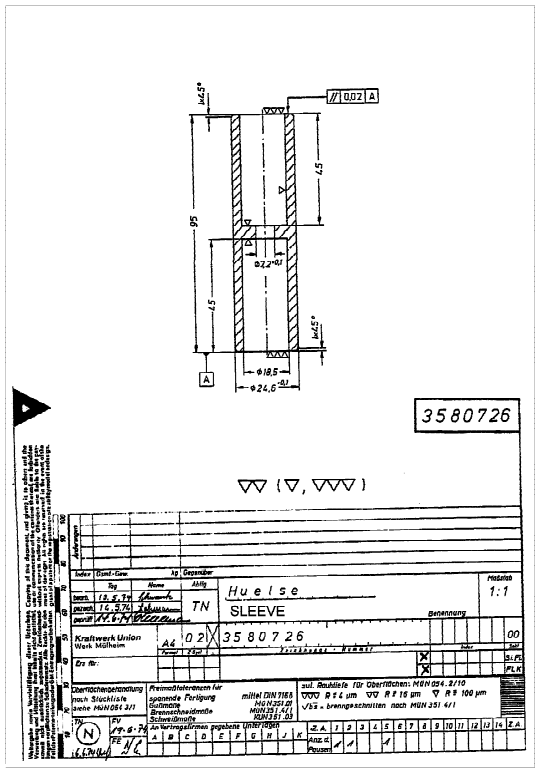
CARD CODE 7 — DRAWING NO. 1-12015-56600

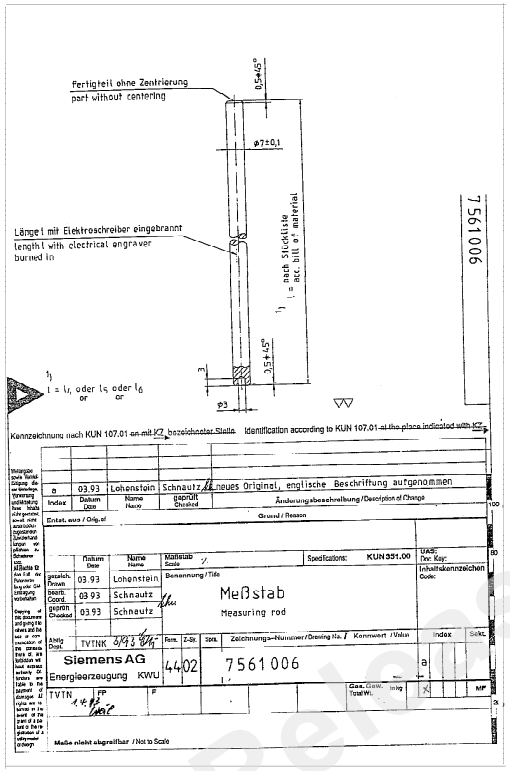
SHEET No. 12 — No. OF SHEETS :13

AI SIZE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)





ADDITIONAL PARTS FOR MEASURING EQUIPMENT 240/260

GRADE OF UNTOL.DIM	
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WELDING-A/B/C/D / AA0621104	
GAS CUTTING-'T3'AA0621101	
GMS No./ C.B.O.M.- NO.	STATUS OF DRG
TYPE OF PRODUCT	STEAM TURBINE
OR	
NAME OF CUSTOMER/PROJECT	
BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR	
DEPT STE	
CODE 4011	
SCALE N.T.S	
WEIGHT (KG) 70.0	
TITLE : STUD HEATING AND MEASURING DEVICE	
CARD CODE	
DRAWING NO. 1-12015-56600	
SHEET No. 13	No. OF SHEETS 13
AI SIZE	

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D K RAY	SD/-	21.03.2017

REV | DATE | ALTERED / CHECKED

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600

Steam Turbines
Description

Gas Heating Device for prestressing Bolted Joints

1 Principle of bolt prestressing

To prestress a bolted joint, the bolts are first heated with the gas heating device, which causes them to expand. The nuts are then screwed down by hand to a predetermined position. As the bolts cool they contract, and by measuring the actual extension under load the prestressing of the joint can be accurately determined.

2 Principle of the gas heating device

Basically, the gas heating device consists of a heating tube, a clamping device, and a mixing chamber complete with supply pipes. It uses a flammable mixture of gas and oxygen (e.g. acetylene and oxygen) and compressed air.

The heating tube is inserted into the hole bored through the bolt, where it is held in a central position by the clamping device. The flame of the burning gas/oxygen mixture in the mixing chamber is surrounded by compressed air. This high temperature mixture flows through the heating tube, is reversed by the bottom of the blind hole in the bolt and flows back up between the outside of the heating tube and the sides of the hole in the bolt to emerge at the end of the bolt. Assuming that the instructions given in paragraphs 4.4 and 4.5 are correctly carried out, this arrangement prevents any local overheating of the material.

3 Application

The gas heating device can be used on any bolt having a bore of 20, 25, 32 or 35 mm. Two bolts may be heatet simultaneously.

4 Method of use

4.1 In order that the extension of the bolt may be determined after prestressing has been carried out, the measurement described in para. 6 must be taken before heating commences.

4.2 Depending on the case in hand, the heating device is to be assembled as shown in Figs. 1 to 3. When inserting the rigid tube of the heating device in the heating bore as per Fig. 1, hold the tube so that its end is 50 to 60 mm from the base of the bore by means of the clamping device (split clamp ring and union nut). If the heating bore is so deep that the tube is not long enough establish this gap by welding on a suitable length of extension tube, machining the weld bulge down until flush with the outer circumference of the tube.

Where flexible heating tubes are used as shown in Fig. 2, establish the gap between the end of the tube and the base of the bore by shortening the tubes.

4.3 The diffuser tips are then screwed to welding blowtorches. The following are the various sizes of nozzle for the various sizes of heating tubes and bolt heating holes:

Tips mm	Acc. heating tube mm	Bolt heating hole mm
Size 6 to 9	16 dia * 2.6	20 dia
Size 9 to 14	20 dia * 2.9	25 dia
Size 14 to 20	25 dia * 2.9	32 dia
Size 20 to 30	26.9 dia * 2.9	35 dia

Continued on Page 2 to 6

4.4 After the flame has been ignited it should be adjusted to produce a fairly weak appearance about midway between a welding flame and a pure heating flame.

4.5 Insert the welding torch prepared as specified in Sections 4.3 and 4.4 in the mixer nozzle (see Fig. 1). Then turn on the compressed air, regulating it so that the heating tube turns **dark cherry red** but not lighter by observing it through the ports in the sleeve (below the union nut).

If a note is made of the air pressure used during the heating of the first bolt it can be taken as a guide for the heating of ohter bolts having the same diameter hole and similar depth. The air pressure must be reduced, if the flame is blown out and great care must be taken to scavenge the hole thoroughly with compressed air to remove any remaining gas before the flame is reignited.

5 Clamping device

5.1 Access from above

5.1.1 If the bolt is accessible from above and there is sufficient clearance to insert the device with the rigid heating tube already screwed into position, then the standard arrangement shown in Fig. 1 can be used.

5.1.2 If the bolt is accessible from above but there is insufficient clearance to permit the introduction of the device in its standard form as shown in Fig. 1, then the arrangement shown in Fig. 2, which uses a flexible tube, and tube bend must be employed.

5.2 Access from below or from the side

If the bolt is accessible from below or from the side, the heating device must be used with the clamping device as shown in Fig. 3. The ring spanner is fixed by means of two clamps and two socket head cap screws, which are screwed into the head of the nut. The clamping device can only be used on 20 and 25 mm dia bolt heating holes.

6 Measuring of the extension

The measuring device comprises a measuring rod, a sleeve and a depth gauge. The measuring rod is composed of measuring elemente, in order to measure the extension of screws by restricted assambly space above the nut.

The measuring rod is centered by washers, which are positioned between the screwed measuring rod elements. Use the fitting washer appropriate for the various diameters of the heating hole. To measure, the measuring rod is inserted into the hole of the screw by a magnet. A 5 mm deep recess is turned into the end of the screw to locate the measuring sleeve.

With the depth gauge, the distance between the top of the measuring rod and the top of the sleeve is measured. To determine the actual extension, this measurement is to carry out before heating and is then to repeated after heating, when the screw has cooled down. The difference between the two measurements is equal to the actual linear extension of the screw (see Fig. 4).

When while measuring the screw is accessible only from below or from the side the measuring rod is pressed against the bottom of the hole in the screw by a prestressed spring with the measuring sleeve in position (see Fig. 5).

If relaxation measurements will be necessary, they must always be performed with one and the same measuring device.

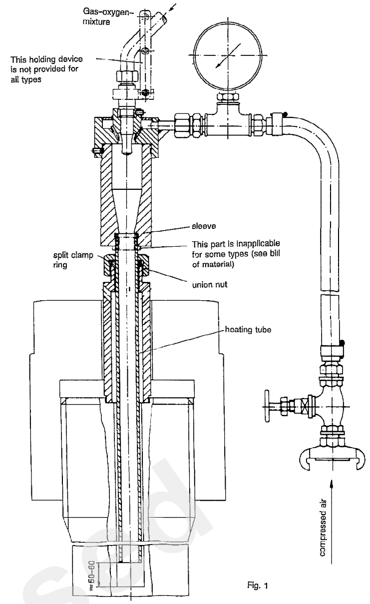


Fig. 1

Clamping device by entering the heating device from above when assembly space is sufficient.

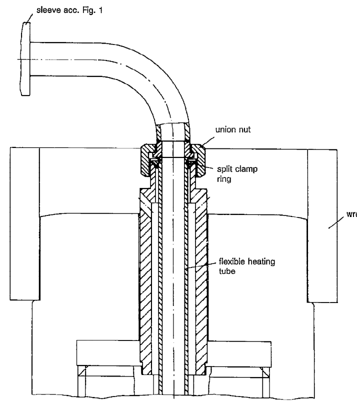


Fig. 2

Clamping device by entering the heating device from above, when assambly space is restricted.

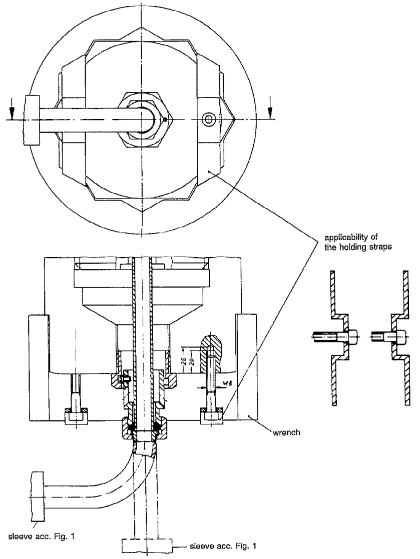


Fig. 3

Clamping device, when the heating device is used from below or from the side (for heating hole Ø20 and 25 mm only)

Anwendung de

from above | from below
all heating holes | heating holes 20 and 25

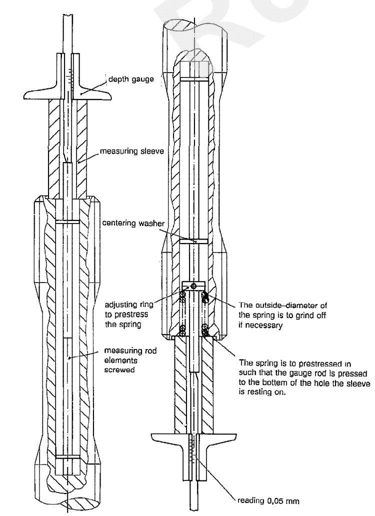


Fig. 4 Fig. 5

Using of the measuring device

COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32

TIN NO.	PSK031K996
REF. DRG. NO.	TUN 01440.2
SIGN. AND DATE	
INVENTORY NO.	

C.B.O.M. No.			STATUS OF U DRG
AGREED DEPT	NAME	SIGN	DATE

GRADE OF UNTOL.DIM
M/CG.- AA0230208
WELDING-AA0621104
~~GAS CUTTING-'T3'AA0621101~~

REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STEAM TURBINE

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	-SD-	21.03.2017
CHD	DINESH	-SD-	21.03.2017
APPD	D.K.RAY	-SD-	21.03.2017

NO. OF VAR — 73 74

DEPT STE CODE 4011	SCALE N.T.S	WEIGHT (KG) 70.0	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS — 75 77

TITLE : STUD HEATING AND MEASURING DEVICE

CARD CODE 7 | DRAWING NO. 1-12015-56600 | 22 23 24

SHEET No. 03 | No. OF SHEETS :13

A1 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600

Steam Turbine

Contents

Gas Heating Device for Bolts

with heating bores 20 and 25 mm diameter

Two heaters are provided for simultaneous heating of two bolts.

A	2	Claws for G1/4" external thread coupling
	2	Gate valves V1/4"
	2	Fuel gas hoses st. length - 0.8 m, with connectors
	2	Pressure measuring instruments with T- and union fittings
	2	Mixing heads with two sleeves, diameter 46 mm
	1	Denim gauge A1no
	1	Measuring rod: 90 mm length
	1	Measuring rod: 50 mm length
	1	Measuring rod: 100 mm length
	5	Measuring rods, each 200 mm length
	1	Magnet for handling the measuring rods in the heating bore
	1	Crepe-rubber plate (formed)
	1	Description M TN 03370
B	2	Reducers, from M20 * 1.5 to M18 * 1.5
	4	Pipes 16 mm diameter * 2.5 * 440 (length)
	2	Sleeves (centering diameter 34 mm) with union nut and clamp ring
	2	Washers for centering the measuring rods; for 20 mm heating bore diameter
	1	Sleeve 34.5 * 94 (diameter) * 80 length (for measurement)
	2	Nozzles, size 6 (8 - 9 mm) for connection with heating torch, with clamp and mounting bracket for reinforcement
C	2	Elbows with welded-on bushing (fabricated from 16 * 2.6 pipe)
	2	Clamp rings (halves)
	2	Metal hoses, length 1000 (corrugated) for 20 mm diameter heating bore
D	4	Pipes 20 mm diameter * 2.9 * 460 (length)
	2	Sleeves (centering diameter 39 mm) with union nut and clamp ring
	2	Washers for centering the measuring rods; heating bore diameter 25 mm
	1	Sleeve 39 * 16 (diameter) * 110 length (for measurement)
	2	Nozzles, size 6 (8 - 14 mm) for connection with heating torch
E	2	Elbows with welded-on bushing (fabricated from 20 * 2.9 pipe)
	2	Clamp rings (halves)
	2	Metal hoses, length 1000 (corrugated) for 25 mm diameter heating bore
F	4	Mounting brackets
	4	Hexagon socket head cap screws M8 * 80 and 4 screws M8 * 60
G	1	Cylindrical compression spring and 1 adjusting ring for tensioning the spring when performing measurement from below, for 20 mm diameter heating bore
	2	Threaded sleeves M24 * 1.5 for heating from below
	4	Threaded bushings M39 * 1.5 for heating from below
H	1	Cylindrical compression spring and 1 adjusting ring for tensioning the spring when performing measurement from below, for 25 mm diameter heating bore
	2	Threaded sleeves M30 * 1.5 for heating from below
	4	Threaded bushings M48 * 1.5 for heating from below

7 accessory hexagon socket set screws M6 * 25

The following parts are provided for each heating bore:

Heating bore 20 mm diameter TUN 01440.2

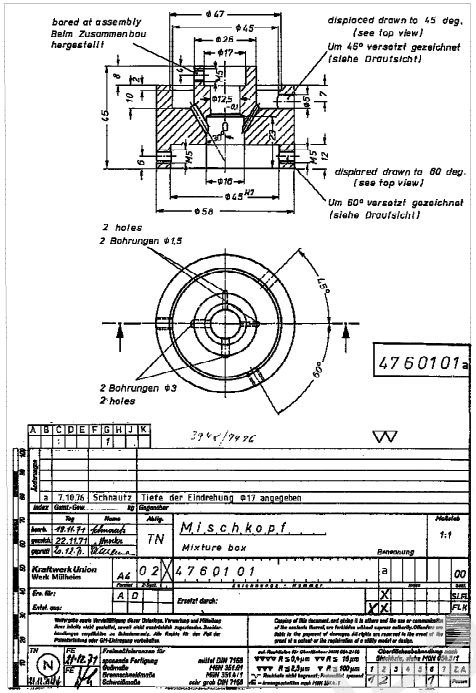
Type 1: all parts listed under A and B
Type 2: all parts listed under A, B and C
Type 3: all parts listed under A, B, C, F and G

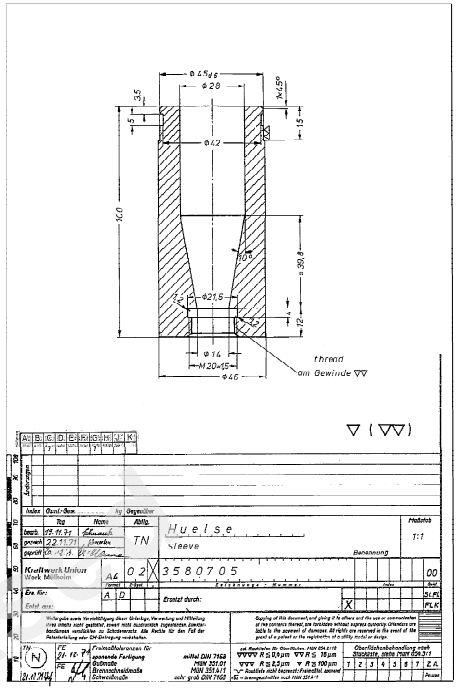
Heating bore 25 mm diameter TUN 01440.2

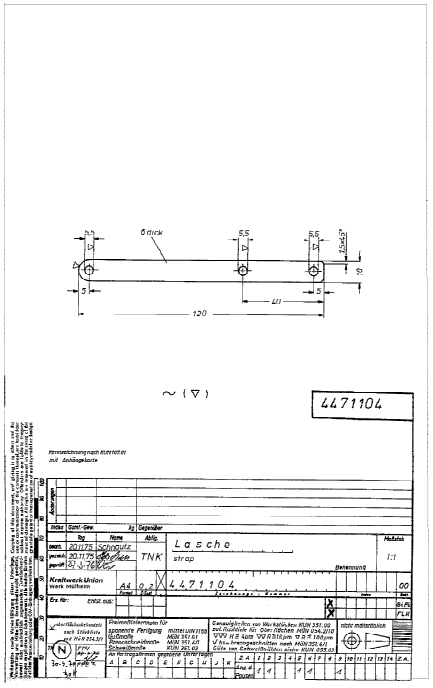
Type 1: all parts listed under A and D
Type 2: all parts listed under A, D and E
Type 3: all parts listed under A, D, E, F and H

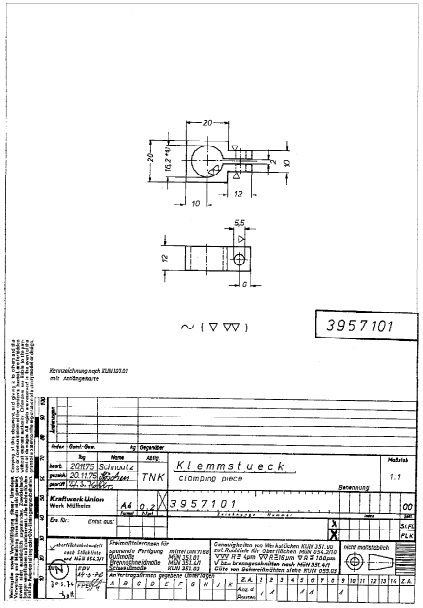
Siemens AG
Energieerzeugung (KWU)

E-M-TN 03371
07.93









COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32

GRADE OF UNTOL.DIM
M/CG.- AA0230208
WELDING-AA0621104
GAS CUTTING--T3-AA0621101

C.B.O.M. No. | STATUS OF DRG

REV	DATE	ALTERED	CHECKED

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: STEAM TURBINE

BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	-SD-	21.03.2017
CHD	DINESH	-SD-	21.03.2017
APPD	D.K.RAY	-SD-	21.03.2017

DEPT STE | CODE 4011 | SCALE N.T.S | WEIGHT (KG) 70.0 | REF. TO ASSY. DRG. | ITEM No. | NO. OF ITEMS

TITLE : STUD HEATING AND MEASURING DEVICE

CARD CODE | DRAWING NO. 1-12015-56600

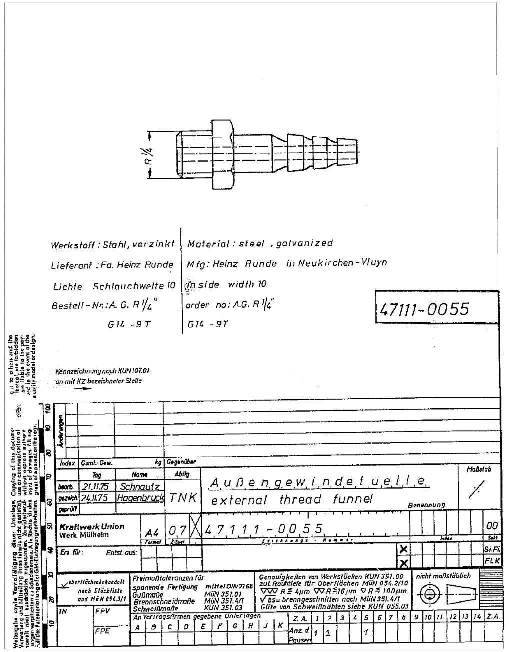
SHEET No. 04 | No. OF SHEETS 13

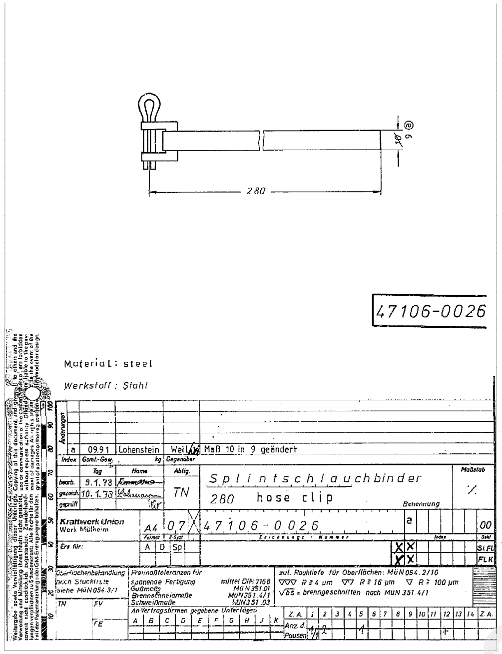
A1 SIZE

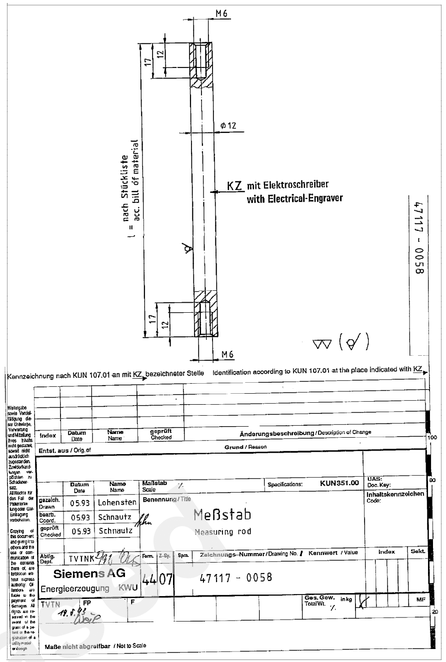
FIRST ANGLE PROJECTION

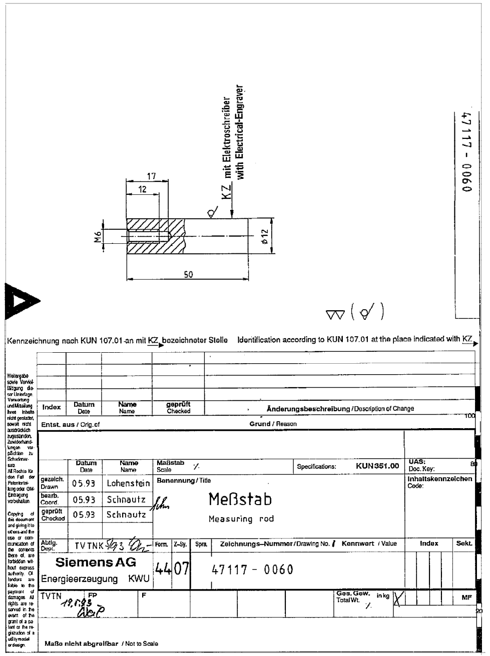
(ALL DIMENSIONS ARE IN mm)

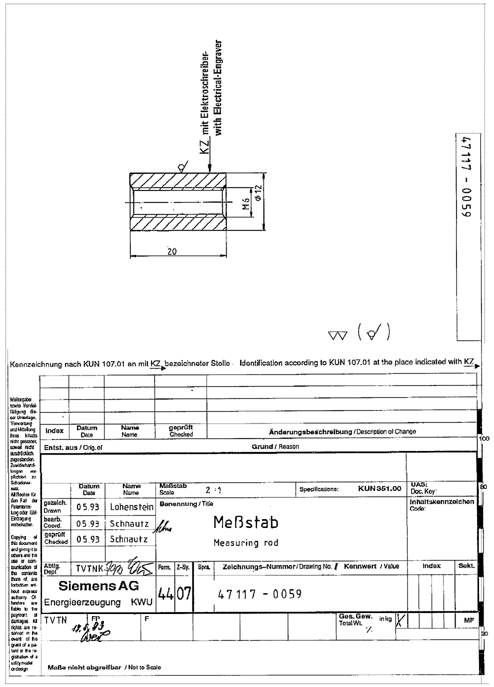
DRG. NO. 1-12015-56600

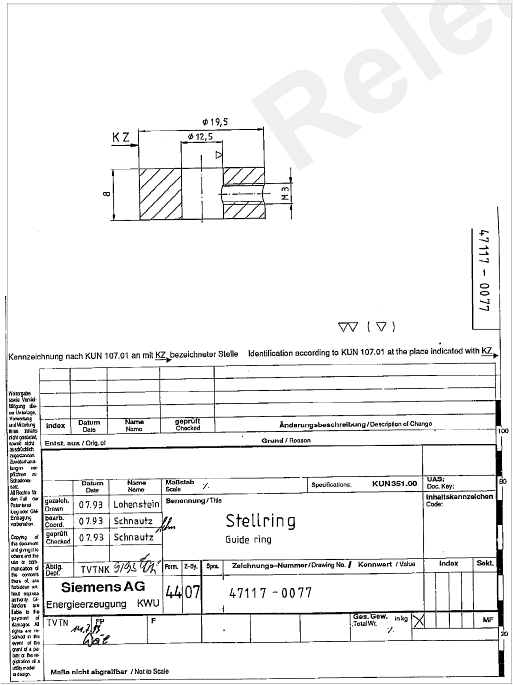


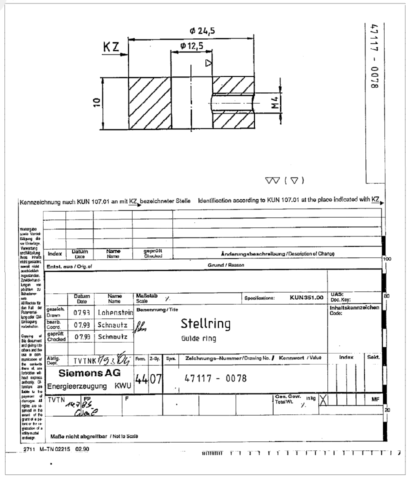












COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32

GMS No./ C.B.O.M.- NO.	STATUS OF DRG	TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STEAM TURBINE

GRADE OF UNTOL.DIM
M/CG.-C/M/F AA0230208
WELDING-A/B/C/D AA0621104
GAS CUTTING-'T3'AA0621101

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

DEPT	STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.
CODE	4011	N.T.S	70.0	

TITLE: STUD HEATING AND MEASURING DEVICE

CARD CODE 7 — DRAWING NO. 1-12015-56600

SHEET No. 05 — No. OF SHEETS :13

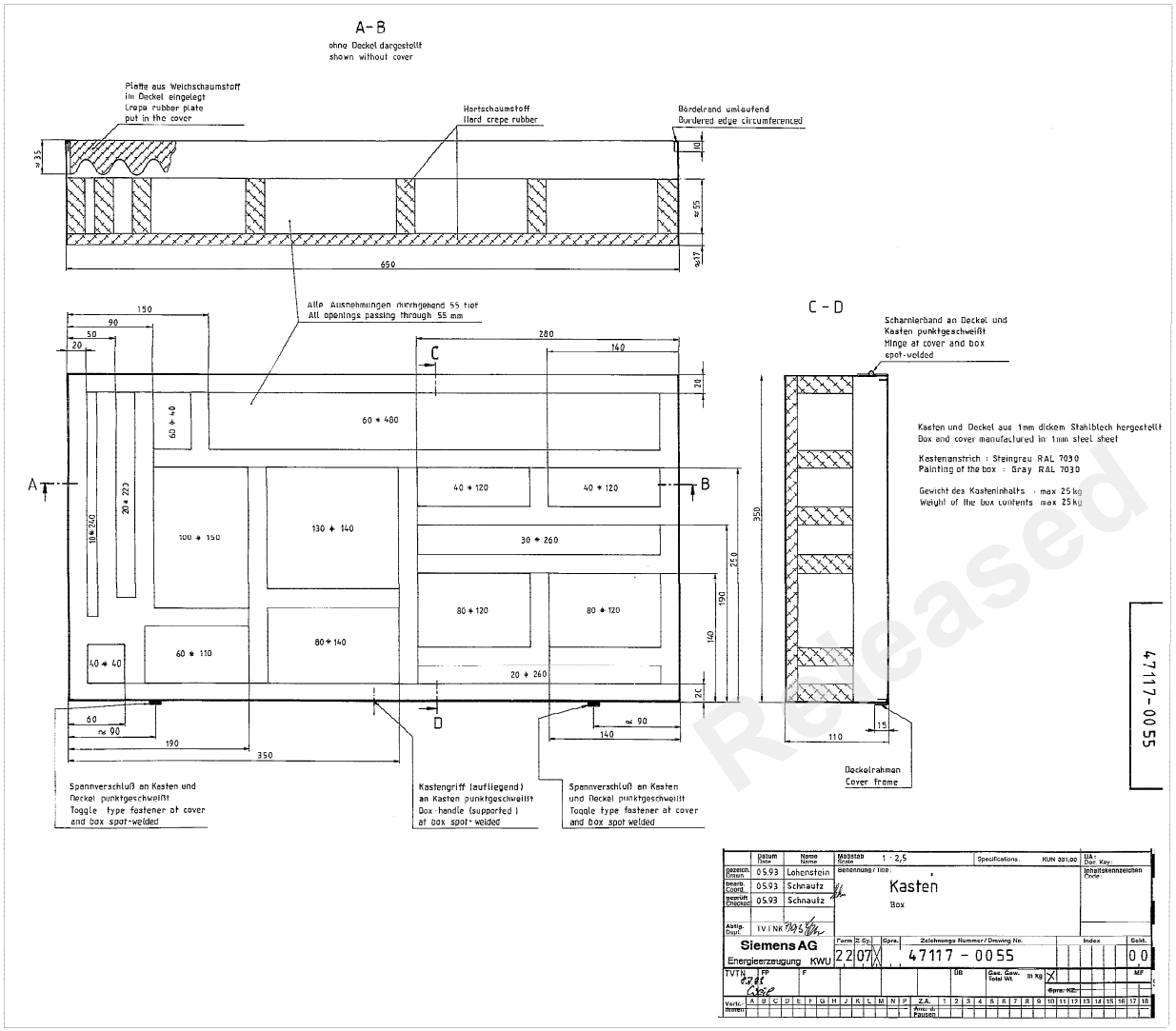
AI SIZE

TN NO. PSH031K996

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600



47117-0055

TECHNICAL REQUIREMENT:

1.ALL ITEMS SHOULD BE PLACED INSIDE THE TOOL BOX AS SHOWN ABOVE.

COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32

GRADE OF UNTOL.DIM					
M/CG.-C/M/F AA0230208					
WELDING-A/B/C/D / AA0621104					
GAS CUTTING-T3'AA0621101					
REV	DATE	ALTERED CHECKED	REV	DATE	ALTERED CHECKED

GMS No./ C.B.O.M.- NO. | STATUS OF DRG

	AGREED DEPT.	NAME	SIGN	DATE

TYPE OF PRODUCT STEAM TURBINE
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

NO. OF VAR. 73 74

DEPT STE | SCALE N.T.S | WEIGHT (KG) 70.0 | REF. TO ASSY. DRG. | ITEM No. | NO. OF ITEMS 76 77

CODE 4011

TITLE : STUD HEATING AND MEASURING DEVICE

CARD CODE 7 22 23 24

DRAWING NO. 1-12015-56600

SHEET No. 06 | No. OF SHEETS 13

A1 SIZE

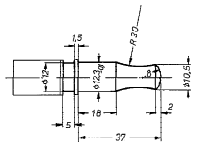
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-12015-56600

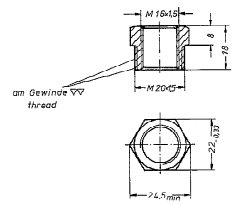
Nacharbeit am Schweißbrenner-Mundstück: der Größe 5 (6 bis 9 mm) und der Größe 6 (9 bis 14 mm) Zeichnungs-Nr. 47111-0051 / 47111-0052

refinishing at the welding torch-mouth piece: Sch. 5 (6 up to 9 mm) Sch. 6 (9 up to 14 mm) drawing 47111-0051 / 47111-0052



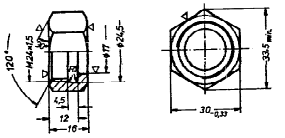
4810201

Mundstueck
Mouth piece



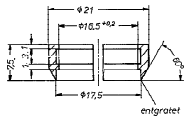
6080201

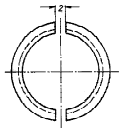
Reduzierstueck
Reducer



4818101

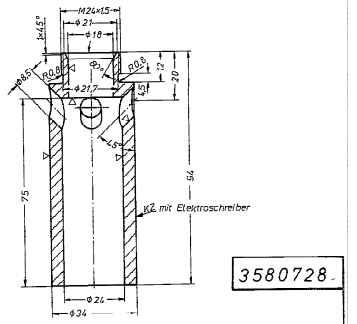
Ueberwurfmutter
Union nut





6094723

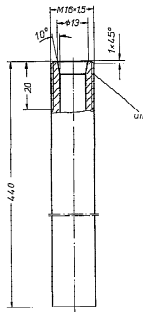
Klemmring
Clamp ring



3580728

Kennzeichnung nach KUN 107.01 an mit KZ bezeichneter Stelle

Huelse
Sleeve



3580708

Halbzeug: Rohr 16 x 2,6 DIN 2462 verwenden

Rohr
Pipe

ADDITIONAL PARTS FOR HEATING BORE (HOLE) 20

GRADE OF UNTOL.DIM	
M/CG.-C/M/F AA0230208	
WELDING-A/B/C/D	AA0621104
GAS CUTTING-T3'AA0621101	

GMS No./ C.B.O.M.- NO. | STATUS OF DRG

	AGREED DEPT.	NAME	SIGN	DATE
DRN		ASHOK	SD/-	21.03.2017
CHD		DINESH	SD/-	21.03.2017
APPD		D.K.RAY	SD/-	21.03.2017

REV	DATE	ALTERED / CHECKED
REV	DATE	ALTERED / CHECKED

TYPE OF PRODUCT STEAM TURBINE
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DEPT	STE	SCALE	N.T.S	WEIGHT (KG)	70.0	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE	4011							

TITLE: STUD HEATING AND MEASURING DEVICE

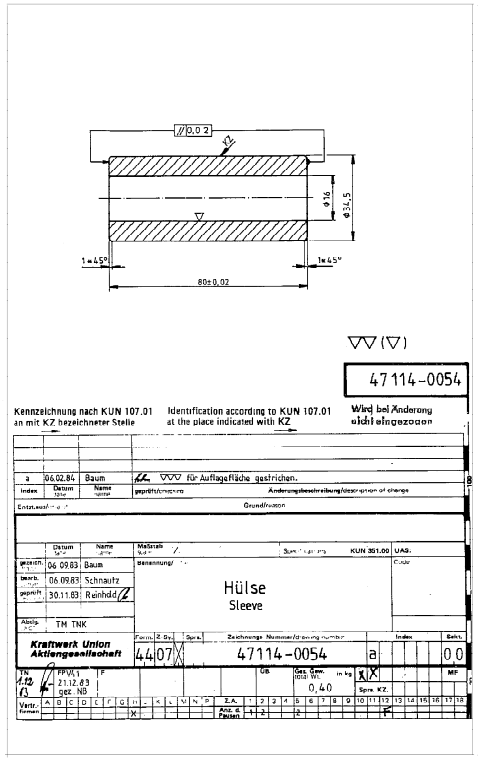
CARD CODE | DRAWING NO. 1-12015-56600

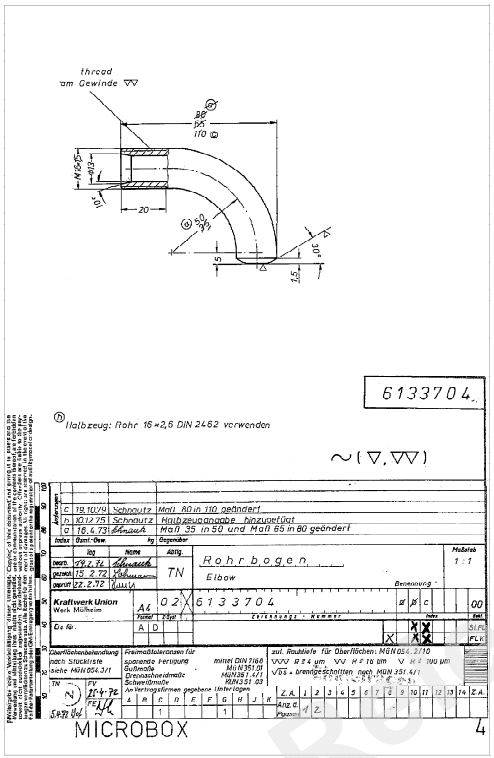
SHEET No. 07 | No. OF SHEETS 13

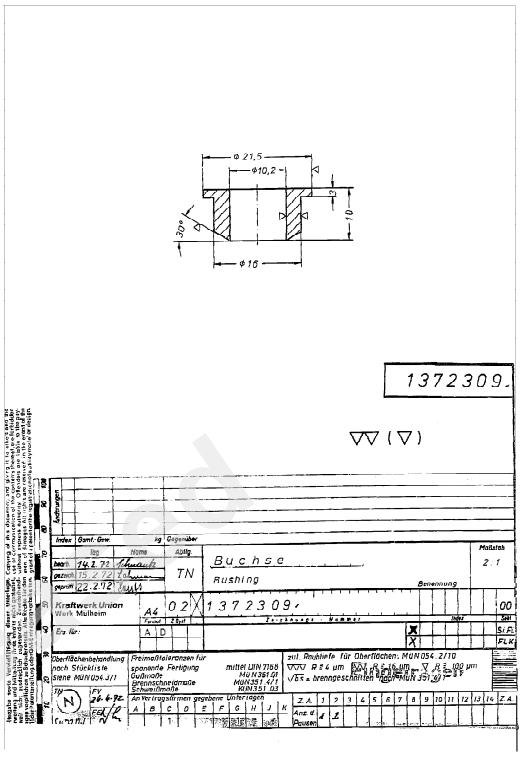
A1 SIZE

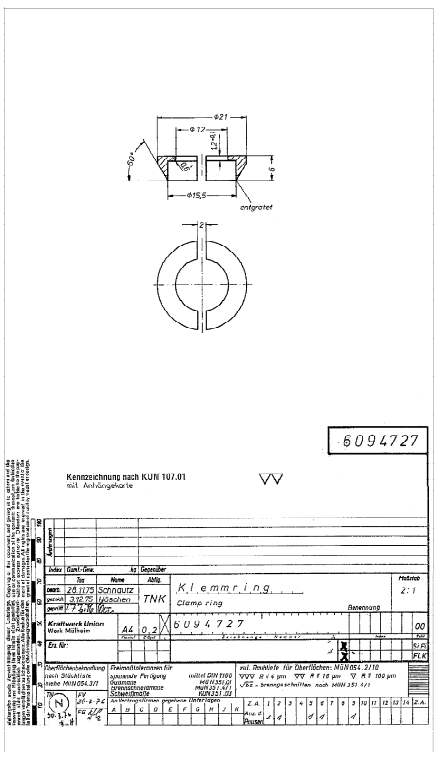
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)









ADDITIONAL PARTS FOR HEATING BORE (HOLE) 20

GRADE OF UNTOL.DIM	
M/CG.-C/M/F AA0230208	
WELDING-A/B/C/D / AA0621104	
GAS CUTTING-'T3'AA0621101	
GMS No./ C.B.O.M.- NO.	STATUS OF DWG
TYPE OF PRODUCT	STEAM TURBINE
OR NAME OF CUSTOMER/PROJECT	
BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR	
DEPT STE	SCALE N.T.S
CODE 4011	WEIGHT (KG) 70.0
TITLE : BOLT HEATING DEVICE PARTS BOLT 20 MM	CARD CODE
REF. TO ASSY. DRG.	ITEM No.
DRAWING NO. 1-12015-66600	NO. OF ITEMS 75 77
SHEET No. 08	No. OF SHEETS :13
AI SIZE	

	NAME	SIGN	DATE
DRN	ASHOK	SD/-	21.03.2017
CHD	DINESH	SD/-	21.03.2017
APPD	D.K.RAY	SD/-	21.03.2017

GAS HEATING DEVICE

1. Description:

"Gas Heating Device" is used during heat-tightening of High Pressure & Intermediate Pressure Turbine joint plane bolts / studs to a predetermined joint pressure. The gas heating device consists of heating tube with clamping device and mixing head with supply pipes. It is used with inflammable gas-oxygen mixture (e.g. acetylene-oxygen) and compressed air. The heating tube is inserted into the bolt bore where it is kept centered by the clamping device. In mixing head, the gas-oxygen flame is surrounded by compressed air. This hot gas mixture flows through the heating tube, is reversed by bottom of the blind hole in the bolt and flows back up between outside of heating tube and the sides of bore in the bolt to emerge at the end of the bolt. (Refer Figure-1)

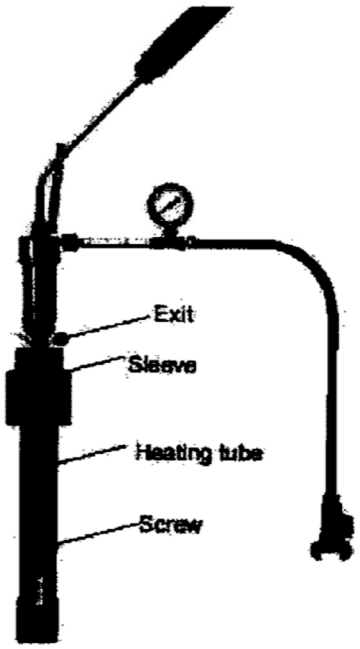


Figure-1

				नाम NAME	दिनाक एवं हस्ताक्षर SIGNATURE & DATE
MEMBER-PSC	NEELU GARG		निर्माणकर्ता WORKED BY	ANOOP KUMAR	19.06.2019
QAX	R.P. Singh		जांचकर्ता CHECKED BY	DINESH L. GOND	19.06.2019
TSX	Sandeep Gupta	02/7/19	समीक्षाकर्ता REVIEWED BY	ALOK KR. SINGH	19.06.2019
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनाक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	R. K. RAY	19.06.2019
SUPERSEDES			स्वीकृति APPROVED : AGM (STE) S. R. PRASAD		Gr. NO. ST : 8.20
REV.NO.	03		निर्माण PREPARED BY : STE-TE	ज़ारी ISSUED BY : TSX	दिनांक DATE : 09-02-1981
DI.	19-06-2019				
CHANGE ADVICE NO.	STE-19-13				

सामग्री सूची संख्या INVENTORY NO. P-52755

In order to determine the expansion after pre-stressing, a measurement should be carried out before heating (actual measured length). The heating device is assembled according to the following instruction, depending on the use. When inserting the rigid tube, make sure that a gap of approx. 50-60 mm remains free to the bottom of the bore (Refer Figure-2). If the heating tube is too long, it must be shortened so that the gap is not less than 50 mm. If the bore is deeper than the length of tube at hand, the tube must be lengthened by welding on extensions. The weld bulge must be adapted to tube outside diameter.

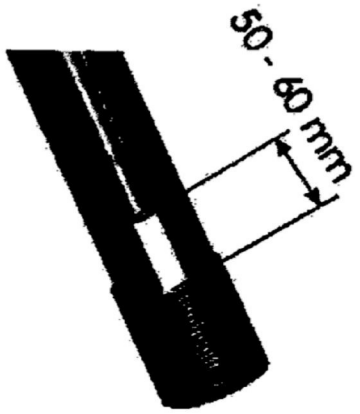


Figure-2

This heating causes elongation of the stud & then the cap nut of corresponding stud is screwed down by a specified amount in hot condition to provide a calculated joint pressure in cold condition.

2. Scope of Work:

a) Scope includes designing, manufacturing and supply of gas heating device.

b) All associated compressed air piping including a fine regulating valve, pressure gauge & pipe fittings.

c) A measuring device for measuring the extension of stud / bolt due to heating.

d) Scope of supply shall be as per Type-3 which shall include all the parts specified in Type-2 & Type-1 along with items specified in Type-3 as shown in this Figure 6.

e) For more details regarding scope of supply, this standard shall be read along with BHEL drawing no. 1-12015-56600. All item specified in drawing no. 1-12015-56600 shall be considered as scope of supply. For item no. given in Figure 4, 5 & 6 of this standard refer BHEL drawing no. 1-12015-56600.

f) This heating device is a portable unit. Heating should be possible in any of the stud in assembled condition. Hence item should be supplied in carry case / box.

The arrangement shown in drawing (Refer Figure-4, 5 & 6) is for reference purpose. The sole responsibility of mechanical design rests with supplier.

3. Functional Requirement and design information:

a) A minimum clear height of 600 mm above the cap nut is available for inserting and removal of the heating device.

b) Separate heating arrangement / component is required for each hole size of heating hole in the stud i.e. 20, 25, 32 and 35.

c) Design should ensure that vent holes for release of hot gases in outer tube remain open to atmosphere in all operating condition.

4. Functional information:

A typical outline sketch, refer Figure. No.4, 5 & 6 shows general arrangement of gas heating device and Figure No.7 – measuring device for reference purpose.

a) Heating source is oxy-acetylene gas.

b) Oxy-acetylene torch is ignited outside and then it is inserted in the hole meant for it in the inlet chamber.

c) A compressed air piping of suitable size is fixed to inlet chamber. Compressed air inscribes the Oxy-acetylene flame at the exit from inlet chamber and led to a mixing chamber.

d) From mixing chamber hot gas mixture is led to heating tube through a bend.

e) Heating tube is held co-axially in the stud hole. End of heating-tube kept at a reasonable distance from end of hole in the stud.

f) After imparting the heat to the stud, this gas-mixture Traverse back through annulus passage between outer tube & heating tube & released to atmosphere through vent holes in the outer tube.

g) A fine regulating valve on compressed air pipe line is provided to regulate the compressed air pressure and same is to be read on circular pressure gauge with a range 0 to 20 ata. A proper air pressure ensure that gas mixture reaches hole bottom with a reasonable velocity. This also helps in restricting the exit velocity of hot gases into atmosphere from safety consideration.

h) An elongation measuring device includes a simple measuring rod, a sleeve and a depth gauge. Readings on the depth gauge showing length of stud are recorded in cold condition before start of heating process, and then after heat tightening again in cold condition. The difference of these reading gives the elongation achieved.

5. Mechanical Design:

a) The sole responsibility of mechanical design rests with supplier. Construction & material of the device should be robust to withstand thermal cycling and thermal stresses. Device should be easy to install, assemble and dissemble.

b) Welding if used anywhere in assembly shall be checked for crack & defects. Defects to be rectified.

c) Due precaution toward operational safety must be taken.

d) Measuring unit consists of sleeve, depth gauge and measuring rod. Depth gauge should have least count of 0.05 mm. Depth gauge should be in general as per DIN 862. Its scale must be case hardened.

6. Compressed air system:

a) The hole in the inlet chamber for insertion of heating torch should match with the standard torch shapes without leaving a large clearance or causing insertion problem.

b) A clamping device to hold the heating torch should be provided.

c) Regulating valve should be able to give the desired degree of regulation & placed close to heating device.

d) Pressure gauge should be able to read the 0.5 ata. difference air pressure.

e) In general, there should not be any burr left on any component. Threading done should of high standard for easy assembly & dissemble. Scale should be flat & move vertically upward or downward freely.

7. Identification :

Each gas heating device should be designated based on the stud heating hole i.e. 20mm, 25mm, 32mm or 35mm. Outer tube shall also be marked for the heating hole size. Heating tube shall also be punched with the O.D & thickness.

8. Functional Testing & Acceptance:

Supplier shall exhibit the suitability of operation of the heating device at BHEL works or at site (to be mutually agreed at enquiry stage). Only after such successful field demonstration device will be finally accepted (if BHEL has already specified this clause in enquiry). This requirement may be waved-off if felt necessary.

9. Packing & Dispatch:

Complete gas heating device shall be dispatched in nicely parted & spaced briefcase / box for avoiding damage during transportation & should be easily carried anywhere.(Refer figure 3)

Figure-3

	भा एप ई एल BHEL	उत्पाद मानक (हीप : हरिद्वार) PRODUCT STANDARD (HEEP: HARIDWAR)	ST 38007 पृष्ठ 12 का 6 Page 6 of 12

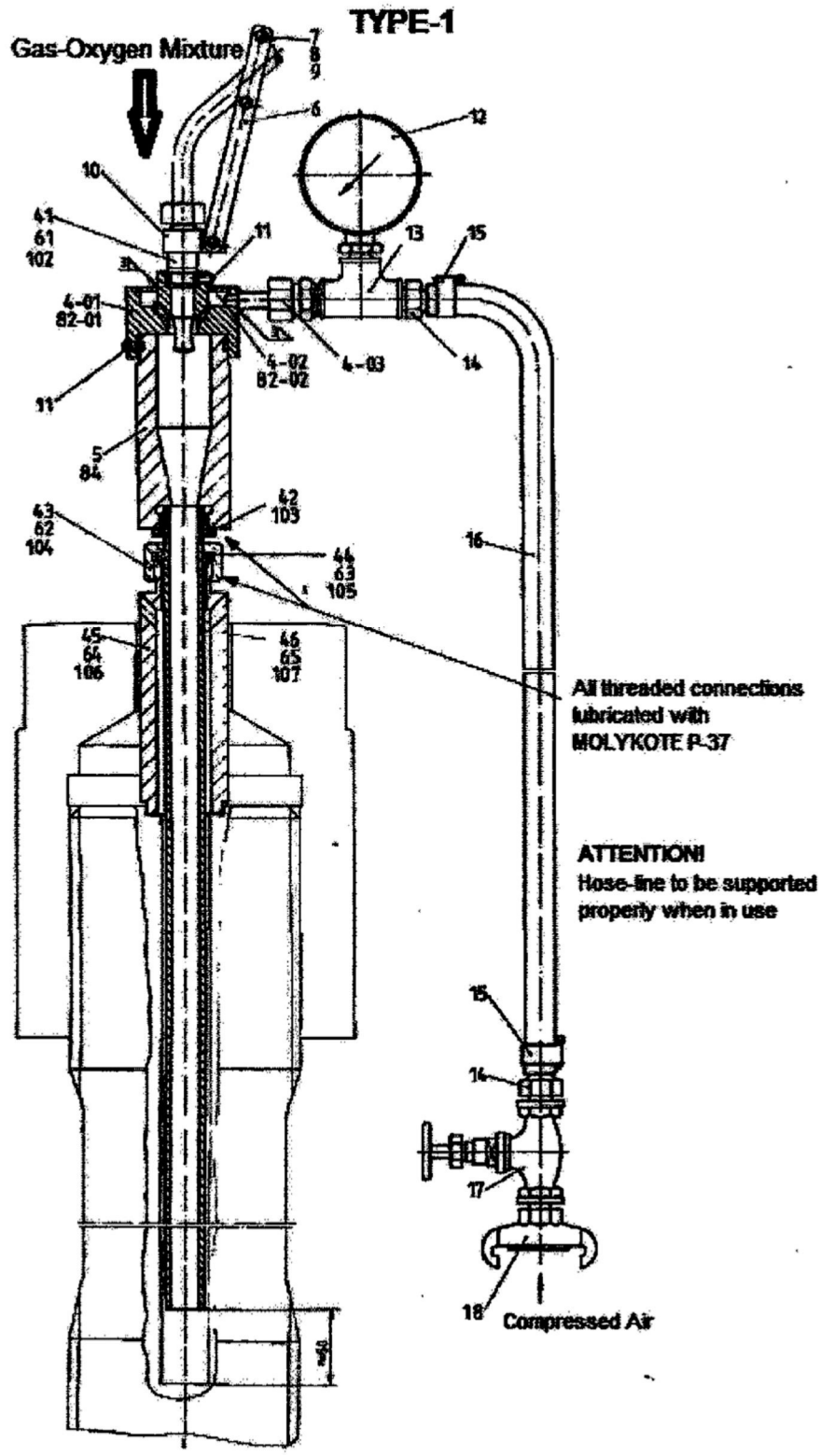


Figure-4 : TYPE - 1

सामग्री सूची संख्या INVENTORY NO. P-5275	REV. NO. 03		निर्माणकर्ता WORKED BY	ANOOP KUMAR	19-06-2019
			जांचकर्ता CHECKED BY	DINESH L. GOND	19-06-2019

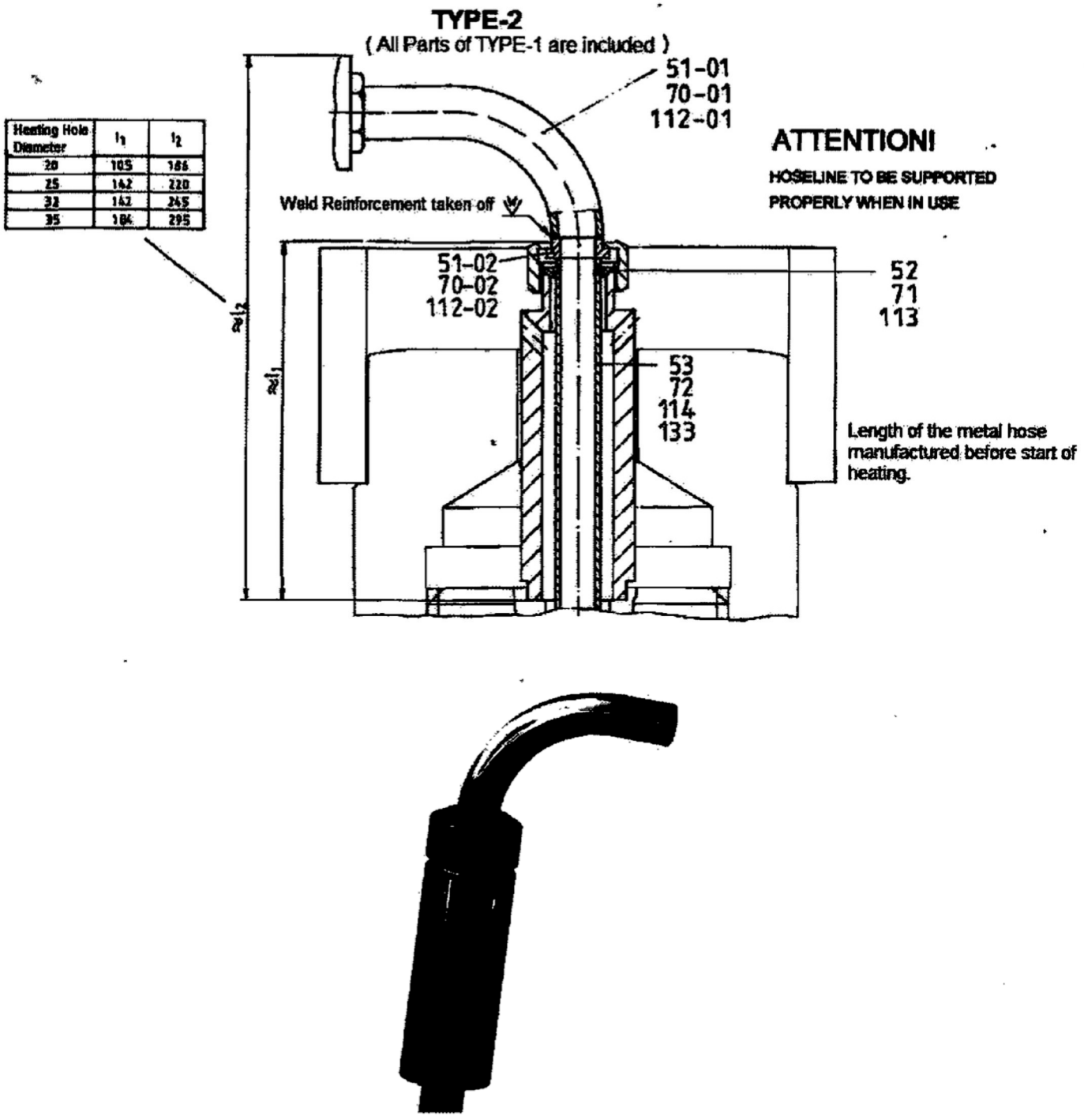
उत्पाद मानक (हीप : हरिद्वार)

PRODUCT STANDARD (HEEP: HARIDWAR)

ST 38007

पृष्ठ 12 का 7

Page 7 of 12



Heating Hole Diameter	l_1	l_2
20	105	166
25	142	220
32	142	245
35	184	295

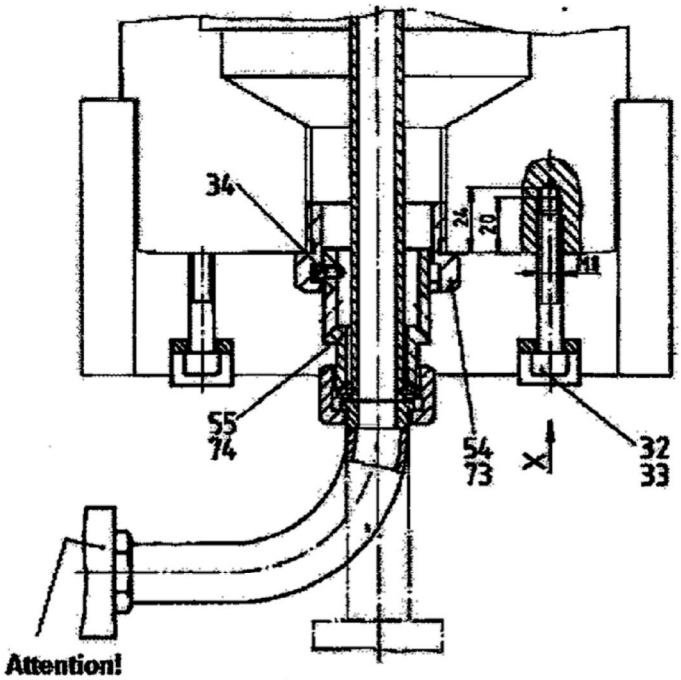
Figure-5 : Type-2 (All parts of TYPE-1 shall also be included along with parts of TYPE-2)

सामग्री सूची संख्या INVENTORY NO. P-5275	REV. NO. 03		निर्माणकर्ता WORKED BY	ANOOP KUMAR	19-06-2019
			जांचकर्ता CHECKED BY	DINESH L. GOND	19-06-2019

TYPE-3

(All parts of TYPE-2 nad TYPE-1 shall be inculded along with parts of TYPE-3)

Heating from below only for heating hole Dia. 20 & Dia. 25mm



Attention!
Hose-line to be supported properly when in use.

View X

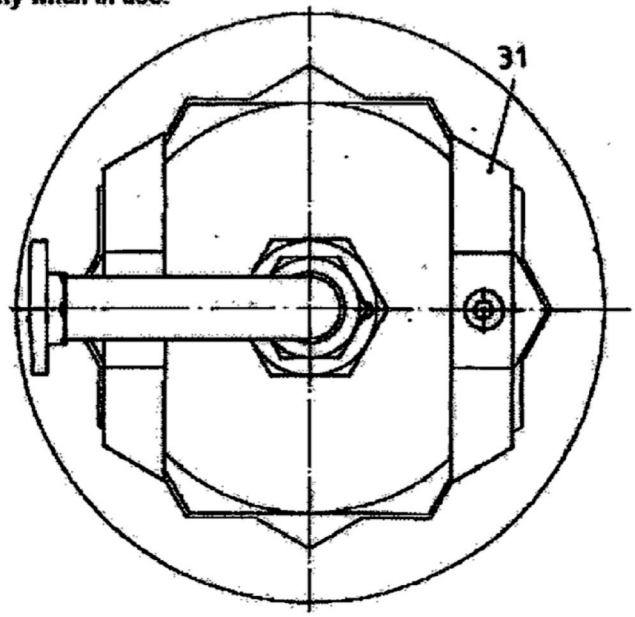


Figure-6 : Type-3 (All parts of TYPE-2 & TYPE-1 shall also be included along with parts of TYPE-3)

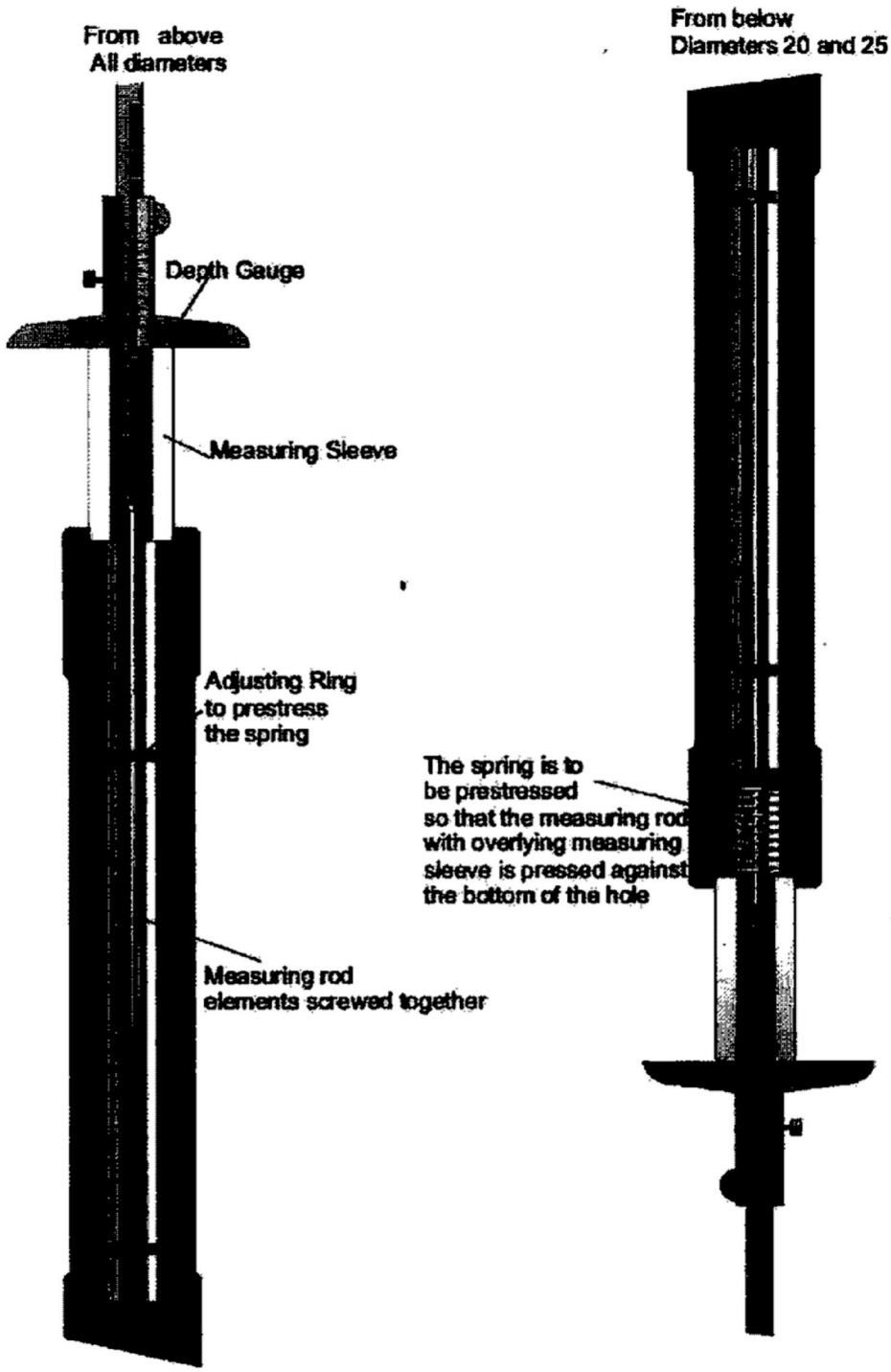


Figure-7 : Measurement scales

REV. NO. 03		निर्माणकर्ता WORKED BY	ANOOP KUMAR	Anoop	19-06-2019
		जांचकर्ता CHECKED BY	DINESH L. GOND	Dineshgond	19-06-2019

उत्पाद मानक (हीप : हरिद्वार)

PRODUCT STANDARD (HEEP: HARIDWAR)

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पृष्ठ 12 का 10
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दिनांक एवं हस्ताक्षर SIGN & DATE

सम्पत्ती सूची संख्या को अधिलेखित करना है SUPERSEDES INVENTORY NO.

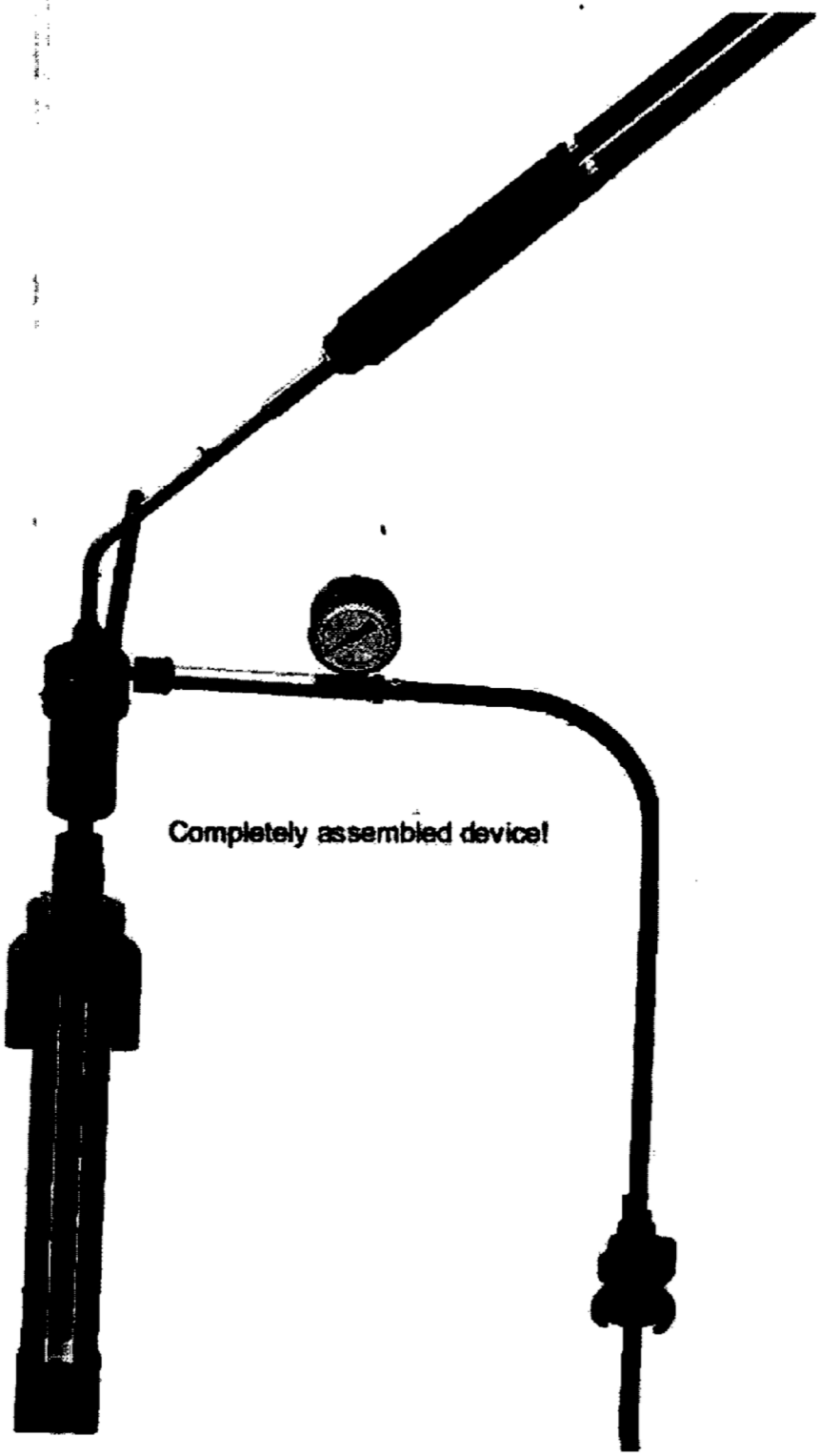

Figure-8 : Standard Equipment (Type-1) Completely assembled device

सम्पत्ती सूची संख्या INVENTORY NO.	P-5275	REV. NO. 03		निर्माणकर्ता WORKED BY	ANOOP KUMAR	19-06-2019
दिनांक एवं हस्ताक्षर SIGN & DATE	04/07/19			जांचकर्ता CHECKED BY	DINESH L. GOND	19-06-2019

उत्पाद मानक (हीप : हरिद्वार)

PRODUCT STANDARD (HEEP: HARIDWAR)

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पृष्ठ 12 का 11

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दिनांक एवं हस्ताक्षर SIGN & DATE

SUPERSEDES INVENTORY NO

सामग्री सूची संख्या को अधिलेखित करना है

दिनांक एवं हस्ताक्षर SIGN & DATE 04/07/19

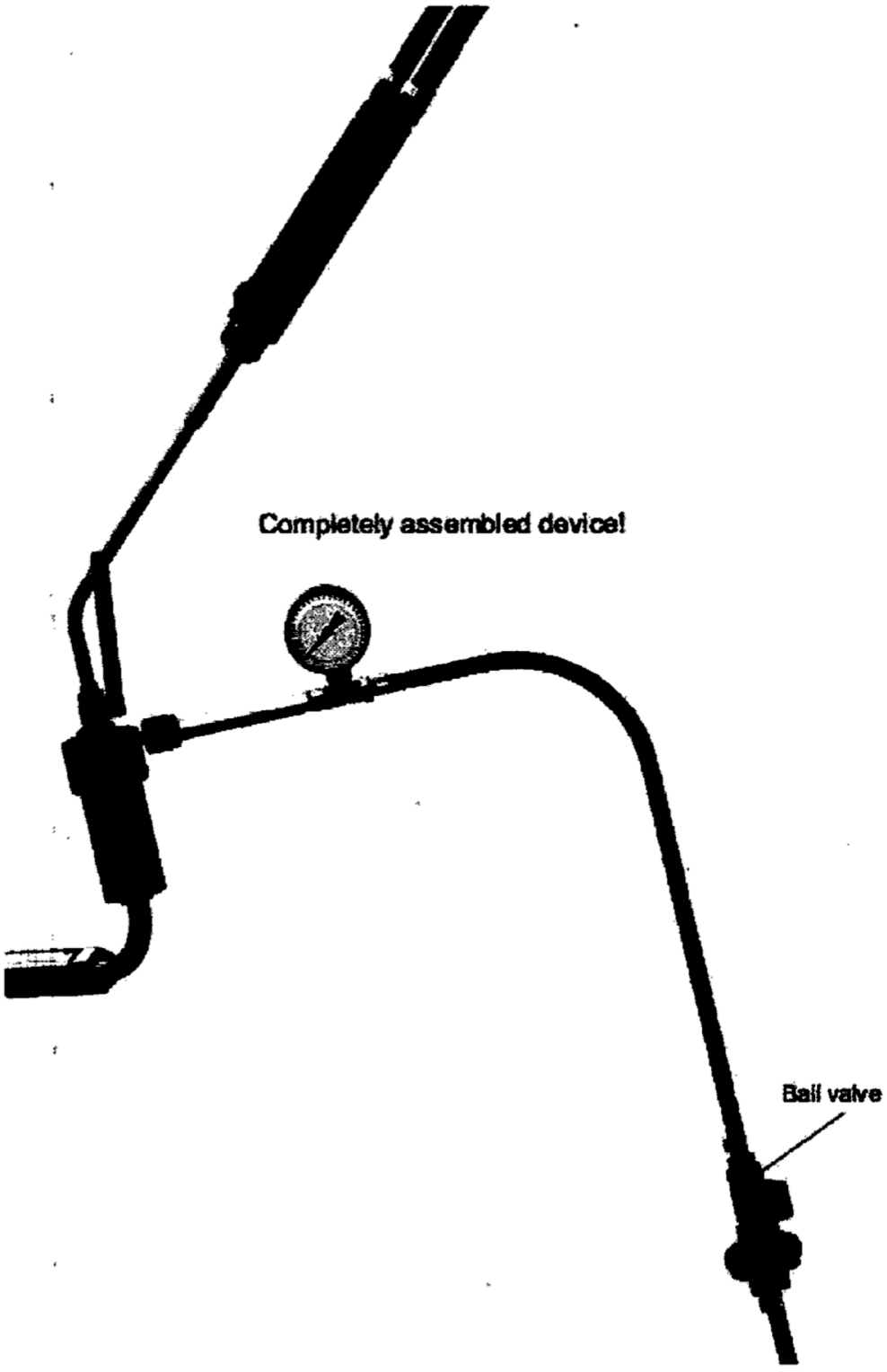

Figure-9 : Type with Bend Equipment (Type-2 & 3) Completely assembled device

सामग्री सूची संख्या INVENTORY NO. P-55275	REV. NO. 03		निर्माणकर्ता WORKED BY	ANOOP KUMAR	19-06-2019
			जांचकर्ता CHECKED BY	DINESH L. GOND	19-06-2019

10. Documents to be submitted by supplier:

a) Three copies of Operation & Maintenance Manual of "Gas Heating Device" which shall include part item details & its item number, the correspond assembly & dis-assembly of product & its operation procedure.

b) Warranty certificate.

c) Certificate of Compliance.

11. Cross Reference:

1) BHEL drawing no. 11201556600

2) Technical Catalogue of M/s Sirius Rohr- und Brennertechnik GmbH, Germany