

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

May 1, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

During the February 14-16, 1984 NRC audit of TVA's Watts Bar Nuclear Plant equipment qualification files, NRC representatives requested that complete documentation packages for three selected mechanical components be provided (1-FCV-77-9-B, 1-RFV-68-563-5, and centrifugal charging pump 1A-A). These documentation packages were transmitted to you by letter dated March 9, 1984. As a result of NRC's review of this material, TVA, during a meeting with NRC representatives on April 18, 1984 at the NRC offices in Bethesda, Maryland, was requested to provide bills of materials for these three mechanical components. As requested, enclosed are the subject bills of materials.

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills
L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 1st day of May 1984

Bryant M. Lowery
Notary Public
My Commission Expires 4/8/86

Enclosures (3)

cc: U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

8405070277 840501
PDR ADOCK 05000390
A PDR

*ADYB
1.*

CHARGING PUMP

PARTS LIST

FOR: TENNESSEE VALLEY AUTHORITY
WESTINGHOUSE PWR SYSTEMS DIVIS

ORDER NO. 43532

TOTAL REQ'D	PART NO.	DESCRIPTION	PATTERN NO.	DRAWING NO.	LINE NO.	COLUMN NO.	MATERIAL NO.	HEAT TREAT.
4	1	SP9 PUMP SHAFT *		013014			57	71
4	2	BS4CPLG ASSY KOPPERS FAST2FS W/SPCR						
4	7	DEFLECTOR RING		A31097			11	
4	7	DEFLECTOR RING		A31097			11	
4	13	HOUSING UPPER *	M5517	D11283			2	
4	13	HOUSING LOWER *	M5518	D11283			2	
4	22	GSKT HD T4 7/16X15 13/16X.175THK		A25837			244	
4	23	SP11 SPACER SUCTION *	M6547	C11316	2	1	1	
40	25	SP 21 KEY RAD IMP		A20209	13	1	23	
4	25	SP 21 KEY SUCT IMP		A20209	13	1	23	
4	26	SP13 WRG RING		A25858	2		132	25
64	27	WASHER		152698	58		68	16
4	28	SP10 RPM4850 VT 1/4 CLR.010 .012 *	M7278	C15760	1	2	317	60
4	29	SP13 BUSHING		A60415			132	25
36	29	SP13 BUSHING INT CVR		A60415			132	25
4	32	SP13 WRG RING		A25859			132	25
36	32	SP13 WRG RING		A25859			132	25
36	33	SP11 COVER INTERM *	M6535	C15819		1	1	
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	5	317	60
4	34	SP10 RPM4850 VT 1/4 CLR.010 .012 *	M6534	C14297	1	35	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	1	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	4	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	4	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	3	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	7	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	2	317	60
4	34	SP10 RPM4850 VT AS CUT CLR.010 .012 *	M6534	C16268	1	6	317	60
4	34	SP10 RPM4850 VT 1/4 CLR .010 .012 *	M6534	C14297	1	34	317	60
4	36	SP11 SPACER DISCH *	M6548	C15820		1	1	
4	37	SP3 CASE ELEV FINAL		D14602				
4	47	BASE PUMP NO48500 91/92/93					79	
4	48	BAFFLE STAT OIL 2 HALVES INNER		A31096	2		11	
4	48	BAFFLE STAT OIL 2 HALVES		A31096	2		11	
4	49	RETAINER OIL S L RG		A16495			14	
4	51	SLEEVE BEARING		C13851	2		277	
4	55	RING OIL SEAL		A19857			11	
4	57	THRUST COLLAR		B15020	20		15	
4	59	THRUST NUT		A31095			68	16
4	61	COVER END *	M6932	B17404			2	
4	62	HOUSING UPPER	M6930	D11282			2	
4	62	HOUSING LOWER	M6931	D11282			2	
4	63	SLEEVE BEARING		C13852	2		277	
4	69	SP13 BUSHING PR RED		B14901	3		132	25
4	72	SP14 SLEEVE SHAFT SEAL		A60456			364	
4	75	SPACER THRUST CLR		B18100	12	7	14	
4	77	SP20 PR RED SLV CLR.012 .014		B14900	3		22	60
4	82	SP 12 DIFFUSER SUCT	M6536	B19242	2		1	
4	83	SP12 DIFFUSER *	M6536	B14885	2		1	
22	83	SP12 DIFFUSER RAD *	M6536	B14885	2		1	
4	85	SP4 HEAD FINAL OPER		D14604				

PARTS LIST

ORDER NO.

43532

FOR: TENNESSEE VALEY AUTHORITY
WESTINGHOUSE PWR SYSTEMS DIV

QTY	TOTAL REQ'D	PART NO.	DESCRIPTION	PATTERN NO.	DRAWING NO.	LINE NO.	COLUMN NO.	MATERIAL NO.	HEAT TREAT
4	4	88	SP 21 KEY PR RED SLV		A20209	13	1	23	
4	4	89	PLATE RETAINER INNER		A29711			14	
4	4	91	HOUSING GEAR PUMP *	M5824	C07450			11	
4	4	92	COLLAP. THRUST WORM GR		A16501			185	
4	4	94	KEY WORM		A20209	7	1	23	
4	4	95	EA LOCKNUT & WASHER SKF N W 5		A23563			89	
4	4	96	WORM		A16503			11	
4	4	97	SLV GEAR PUMP BCG UPR		A16504			11	
4	4	98	SLV GR PUMP BG LWP		B17405			185	
4	4	99	SHAFT GEAR PUMP		A02840		1	89	
4	4	100	GEAR PUMP		A20207	23	1	14	
4	4	101	KEY PUMP GEAR	M5506	B11145			11	
4	4	102	COVER GEAR PUMP *		A23562			106	
4	4	103	GEAR WORM		D14617				
4	4	105	SP8 SEAL HSG RADIAL		D14618				
4	4	106	SP8 SEAL HSG THRUST						
16	16	108	DWL OR PIN 1/16X5/32LG					225	
4	4	165	KEY COUPLING		A20216	4	3	68	16
12	12	169	SP 21 SPACER RING		A10359	23		21	21
4	4	173	EA LOCKNUT & WASHER SKF N W 4						
4	4	205	KEY WORM GEAR		A20207	10	1	14	
4	4	206	GEAR IDLER		A02840		2	89	
8	8	215	COLLAR SHAFT SLV		A29132			42	
16	16	243	GSKT INR HD 10 5/16X11 3/16X.175THK		A10450	26		244	
4	4	280	SP12 DIFFUSER DISCH *	M6537	B14886			1	
4	4	309	KEY THRUST COLL		A20210	16	2	23	
4	4	320	PLT IN HALVES OIL RESERVOIR CVR *	M6124	B12449	2		101	
4	4	326	PLATE RETAINER OUTER		A29712			14	
8	8	375	SP7 SEAL PLATE OUTER		D14638			377	
4	4	426	HOUSING GR PUMP SHAFT *	M5513	C13850			101	
8	8	433	O RING SLV ARP 568 228					374	
8	8	435	O RING ARP568 263					374	
8	8	439	SP 21 KEY SEAL SHFT SLV		A22822	1		23	
8	8	450	PACKING RING		A60454			21	
4	4	462	SP 21 ASSY RAIL		A25840	11	4	23	
64	64	477	SP6 NUT HEX		B19901			383	
64	64	478	SP5 STUD MILL		B19897			259	
44	44	545	SP 21 SPLIT RING SHAFT		A60396			57	21
4	4	547	THERMOM STRAIGHT2STEM JAY268L50 30		PL2852		24		
4	4	552	BAFFLE STAT OIL 2 HALVES OUTER		A31096	2		11	
8	8	595	GASKET PLT & SEAL HSG 1/64THK					39	
4	4	640	SP 21 SEAL HSG END CVR RAD		C15855			21	
4	4	670	SP 21 SEAL HSG END CVR THRUST		B18996			21	
4	4	672	O RING OIL RES CVR PLT					211	
4	4	673	GASKET RES CVR PLT					229	
4	4	674	O RG OUTER PLT ARP568 262		A14651			211	
4	4	675	SP13 LOCKNUT PR RED SLV		A60397			42	21
4	4	682	CHAMBER UPR HF KBRY OIL RETURN *	M5511	B09061			214	
4	4	682	CHAMBER LWR HF KBRY OIL RETURN *	M5512	B09061			214	
4	4	690	O RG ARP568 242 UPR CHAMBER					211	

PARTS LIST

ORDER NO. 9-2532

FOR: TENNESSEE VALLEY AUTHORITY
WESTINGHOUSE PWR SYSTEMS DIVISION

TOTAL REQ'D	PART NO.	DESCRIPTION	PATTERN NO.	DRAWING NO.	LINE NO.	COLUMN NO.	MATERIAL NO.	HEAT TREAT.
4	37	O-RG ARP568-228 LWR CHAMBER					211	
4	38	OIL CONTROL RING 7 JHJ KBRY						
3	31	O-RING SL HSG ARP568-256					374	
4	1029	SHAFT IDLER GEAR		A20270			185	
12	1148	SP-21 LOCKING KEY		A22985	5		23	
106	1148	SP-21 LOCKING KEY		A22985	5		23	
12	1148	SP-21 LOCKING KEY		A22985	5		23	
108	1306	SP-21 LOCK KEY BUSHING		A22985	1		23	
12	1306	SP-21 LOCK KEY BUSH		A22985	1		23	

KOPPERS SELF-ALIGNING COUPLINGS

These instructions apply specifically to the following couplings: Forged Steel, Mill Motor, Double Mill Motor, Model B, Model B Mill Motor, Model B Double Mill Motor, Cast Steel, and Flex-Rigid, Floating Shaft Arrangements and Spacer couplings of the preceding types. For other couplings these instructions are supplemented by Special Instructions supplied with each coupling.

LUBRICATION INTERVAL Lubricant should be checked to see that proper level is maintained and that lubricant is free of contaminants. Grease is recommended if operating periods exceed six months. If oil is used the coupling should be filled at six month intervals for the average industrial application. Other conditions, such as very slow speed operation, reversing drives, high temperatures and severe environments may require shorter lubrication periods.

APPROVED LUBRICANTS For applications with ambient temperatures below 150°F, use a grease or oil as recommended below. For higher ambient temperatures contact Koppers Company, Inc. for specific recommendations. Greases listed below are in response to requests for specific recommendations. This list is not complete and is not intended to restrict the use of equivalent lubricants manufactured by companies not listed, nor is it intended to exclude improved lubricants developed since publication of this list.

OILS Use a mineral base oil having a viscosity no lighter than 150 SSU (Saybolt Seconds Universal) and no heavier than 1000 SSU at 210°F.

For example: Gear oil SAE 140, #8 AGMA, etc. or heavier oils.

GREASES

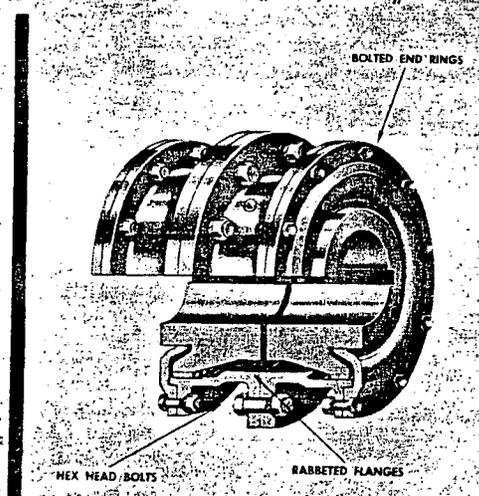
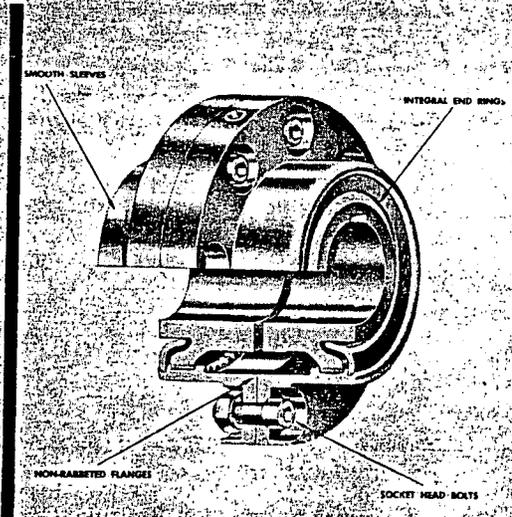
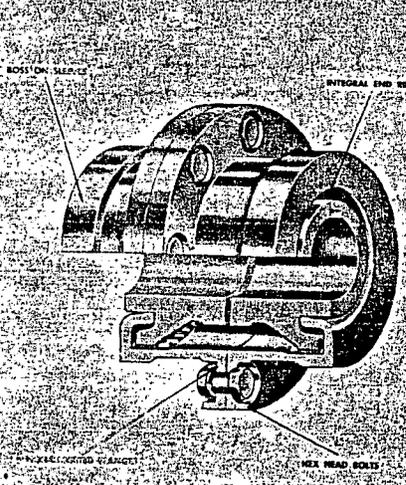
- | | | | |
|---------------------------------|---------------------------|--------------------------------|-----------------------------|
| ATLANTIC REFINING COMPANY | ATLANTIC LUBRICANT # 17 | RICHFIELD OIL CORPORATION | ROCOLUBE RR |
| AMERICAN OIL COMPANY | AMOBAR S | SHELL OIL COMPANY | SHELL ALVANIA GREASE # 2 |
| BROOKS OIL COMPANY | LEADOLENE 375 LIGHT | SINCLAIR REFINING COMPANY | SIMNIA 012 |
| CITIES SERVICE PETROLEUM, Inc. | TROJAN GREASE A-1 | SOCONY-MOBIL OIL CO., Inc. | SINCOLUBE # 1, OR LITHOLINE |
| CONTINENTAL OIL COMPANY | CONOCO SUPER LUBE | STANDARD OIL CO. OF CALIFORNIA | MULTI-PURPOSE GREASE # 2 |
| FISKE BROTHERS REFINING COMPANY | LUBRIPLATE # 630 AA | STANDARD OIL CO. OF OHIO | SOVAREX L-O |
| GULF OIL CORPORATION | CROWN # 1 | SUN OIL COMPANY | MOBILPLEX EP # 0 |
| HUMBLE OIL AND REFINING COMPANY | FIBRAX 370 OR NEBULA EP 0 | TEXAS COMPANY | CALOL SA # 1 |
| KEYSTONE LUBRICATING COMPANY | KEYSTONE # 15 EP XX LIGHT | TIDEWATER ASSOCIATED OIL CO. | SOHIO # 77 |
| MASTER LUBRICANTS COMPANY | LUBRIKO GREASE M-54 | UNION OIL CO. OF CALIFORNIA | N 751 AND 741 EP |
| PHILLIPS PETROLEUM COMPANY | PHILUBE # 1 STOCK 401 | | MARFAK # 1 |
| PURE OIL COMPANY | POCO FIBRE GREASE # 1 | | TYCOL ALITHO # 10 |
| | | | BALL ROLL # 1 OR ELNOBA # 1 |

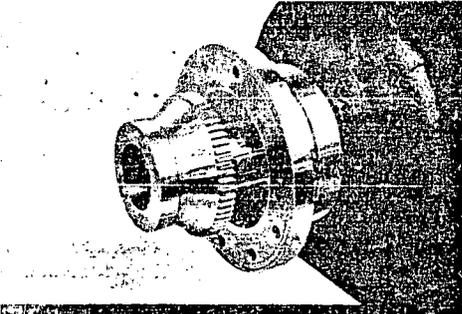
IDENTIFYING FEATURES

Forged Steel #1 1/2 to #7

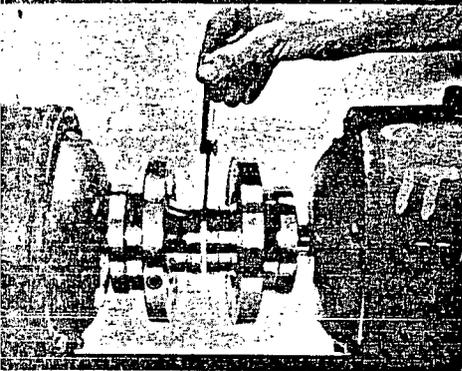
Model B #1 to #3 1/2

Cast Steel #5 1/2 to #30

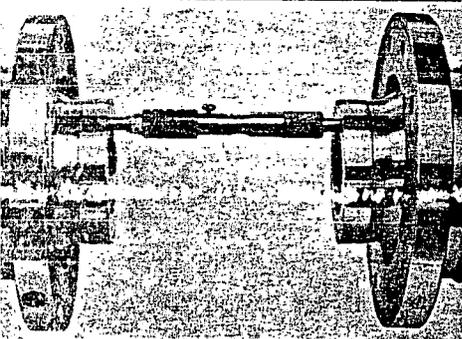




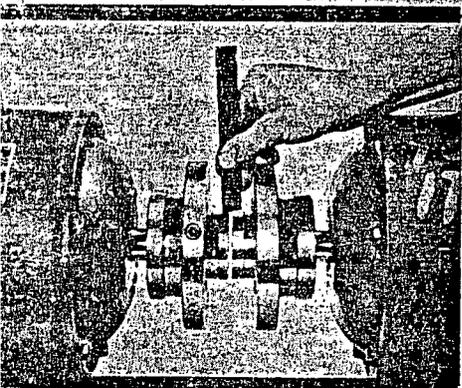
1 Place sleeve over shaft end as shown. (For couplings with bolted end place end ring over shaft). Lubricate end of shaft. Expand hub (or rigid half) with heat, using hot oil or oven to approx. 300° F. Do not apply flame to hub teeth. Unless otherwise specified, hubs are supplied with a nominal interference fit of .0005 in./in. of shaft diameter. Install key with tight fit on sides and a slight clearance over or under the key. On bolted end ring couplings the sleeve should now be mounted and bolted to the end ring, with gasket installed between flanges (as per instruction 7). For mounting of taper bored hubs, refer to Note 5.



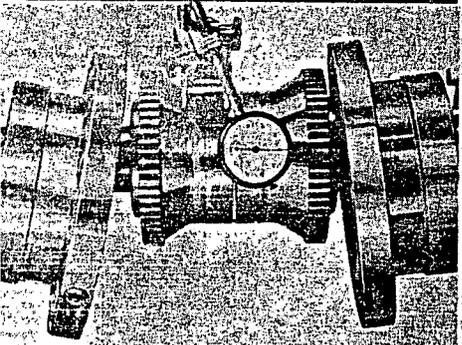
2 **CHECK ANGULAR ALIGNMENT**
For normal hub separation use feeler gage at 4 points 90° apart. Position machines to obtain best possible alignment. Maintain correct hub separation. This is the "C" dimension shown on the last page of these instructions or on ASSEMBLY DRAWINGS.



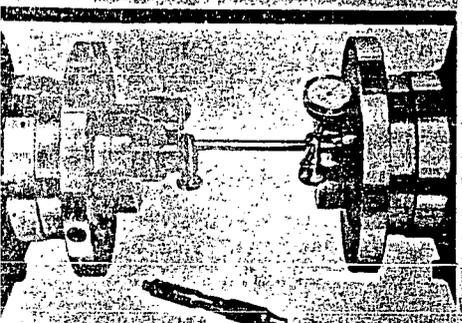
3 **CHECK ANGULAR ALIGNMENT (Greater Hub Separation)**
For greater hub separation (such as spacers and floating shaft arrangements), use micrometer at 4 points 90° apart and proceed as in Instruction 2.



4 **CHECK OFFSET ALIGNMENT - SIGHT METHOD**
By shimming one machine, align shafts using a straight edge as shown until it appears to be at right angles to the shafts. Repeat at three additional points approximately 90° apart. This method is adequate for normal applications. Recheck angular alignment and hub separation per Instruction 2. (For precision alignment the Instrument Method described in Instruction 5 is recommended).



5 **CHECK OFFSET ALIGNMENT - INSTRUMENT METHOD**
Fasten or clamp indicator bracket on one hub with dial indicator button contacting alignment surface of opposite hub. Rotate hub ON WHICH INDICATOR IS ATTACHED, and take readings at 4 points 90° apart. Move either machine until readings are identical. Recheck angular alignment per Instruction 2.



6 **CHECK OFFSET ALIGNMENT - INSTRUMENT METHOD (Greater Hub Separation)**
For greater hub separation (such as spacers and floating shaft arrangements), use dial indicator as shown, and proceed as in Instruction 5. Recheck angular alignment as in Instruction 3.

INSERT GASKET

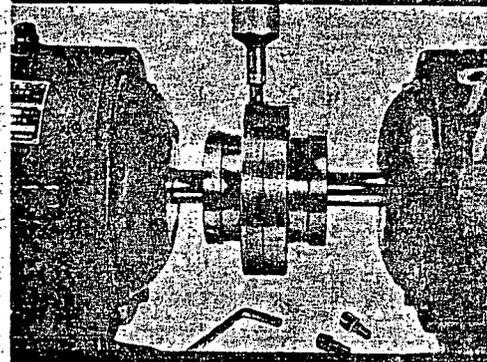
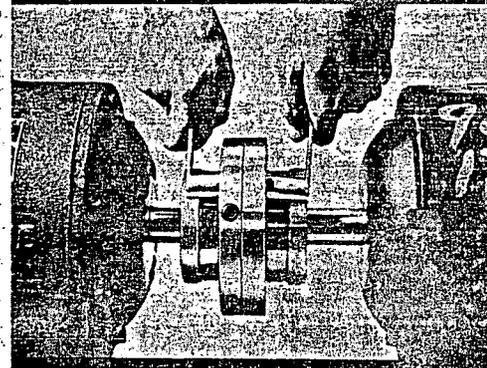
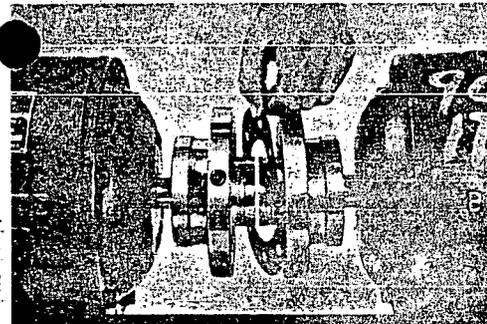
Inspect to insure gasket (or neoprene O-ring) is not torn, cracked or damaged. Clean coupling flanges thoroughly, and insert gasket between flanges. (Position O-ring in grooves.) For spacers or floating shaft arrangements, gaskets must be inserted between both sets of flanges.

ASSEMBLE COUPLING

Draw flanges together, positioning lube holes 180° apart on Model B and 90° apart on Forged Steel couplings. Keep gasket bolt holes in line with flange bolt holes. Insert and tighten bolts, lockwashers and nuts provided. (Special wrenches are furnished with shrouded bolt couplings.)

LUBRICATE AND TIGHTEN PLUGS.

Remove two lube plugs 180° apart. Position coupling so that one hole is 45° above horizontal. Apply lubricant in this hole until excess starts out of lower opening. Sufficient lubricant has now been added. Specific lubricant capacities are listed on the last page of these instructions. For spacers with limited end float thrust plates and for floating shaft arrangements, each end must be separately lubricated. (As only one lube hole is provided in each Model B flexible half, hand packing of grease is recommended in these applications.) Before replacing lube plugs, make sure that copper ring gaskets are in position and undamaged. Tighten plugs with wrench furnished with coupling.



- 1 RECHECK ALIGNMENT AFTER ALL FOUNDATION BOLTS AND MECHANICAL CONNECTIONS ARE TIGHTENED.
- 2 COUPLINGS WHICH HAVE BEEN DYNAMICALLY BALANCED MUST BE ASSEMBLED WITH PARTS IN THE SAME RELATIVE POSITION AS RECEIVED FROM THE FACTORY. MATCH MARKS ARE SCRIBED ON ALL PARTS TO PERMIT PROPER REASSEMBLY. EACH BOLT, NUT AND LOCKWASHER IS WEIGH BALANCED AS A UNIT, AND EACH NUT AND LOCKWASHER MUST BE REASSEMBLED ON THE SAME BOLT.
- 3 Installation illustrated is that of a typical Forged Steel coupling, but is also applicable for other couplings as stated on first page.
- 4 SERIAL NUMBERS OF ALL FAST'S COUPLINGS ARE STAMPED ON THE O.D. OF THE SLEEVE FLANGE, AND ARE SUFFICIENT INFORMATION FOR REORDERING AN EXACT DUPLICATE OF THE COUPLING.
- 5 Mounting of Taper Bored Hubs

A. Heat Method

Heat hub to approximately 200°F maximum and push on shaft applying pressure manually. This will give an interference fit of approximately .0005 inch per inch of shaft diameter.

B. Draw Method

Mount the cold hub hand tight on the shaft and rap with soft mallet to establish initial snug fit. Draw hub up an additional distance as tabulated below to obtain an interference fit of approximately .0005 inch per inch of shaft diameter.

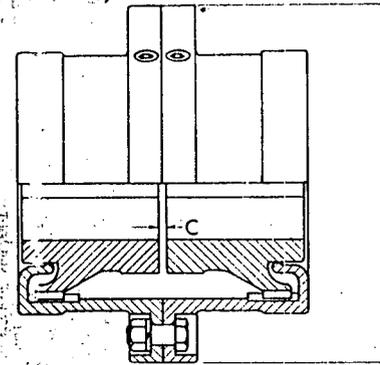
RECOMMENDED DRAW (inches)

COUPLING SIZE		1	1½	2	2½	3	3½	4	4½	5	5½	6	7	8	9	10
SHAFT TAPER	½" per ft.	.024	.031	.036	.040	.043	.046	.050	.054	.060	.066	.072	.084	.096	.108	.120
	¾" per ft.	.016	.021	.024	.027	.029	.031	.033	.036	.040	.044	.048	.056	.064	.072	.080
	1½" per ft.	.008	.010	.012	.014	.015	.016	.017	.018	.020	.022	.024	.028	.032	.036	.040

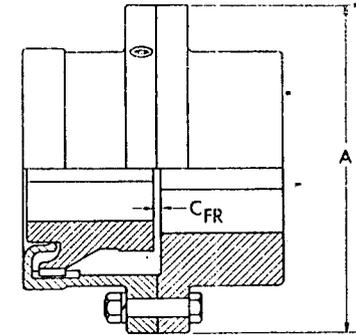
Some values above appear larger than theoretically necessary since accumulation of tolerances has been considered.

FORGED STEEL and MILL MOTOR

COUPLING SIZE		1½	2	2½	3	3½	4	4½	5	5½	6	7
GREASE CAPACITY (U.S. PINTS)	FULL FLEX	¾	1	1½	2¼	3¼	4½	6	9½	12½	16½	
	FLEX-RIGID	¾	1	1½	2¼	3¼	4½	6	9½	12½	16½	
	SPACER ONLY (per in. of length)	.05	.10	.15	.20	.30	.45	.55	.60	.90	1.0	1.5
OIL CAPACITY (U.S. PINTS)	FULL FLEX	⅜	½	¾	1	1¼	1½	2	3½	3¾	5	
	FLEX-RIGID	⅜	½	¾	1	1¼	1½	2	3½	3¾	5	
	SPACER ONLY (per in. of length)	.02	.04	.05	.07	.08	.12	.15	.18	.22	.25	.35
HUB SEPARATION—"C" (inches)		⅜	⅜	¾	¾	1¼	1¼	1½	1½	2	2½	
HUB SEPARATION—"CFR" (inches)		¾	¾	1½	1½	2¼	2¼	3	3	4¼	5¼	
FLANGE O.D.—"A" (inches)		6	7	8½	9½	11	12½	13½	15½	16¼	18	20¼



FORGED STEEL COUPLING



FLEX-RIGID COUPLING

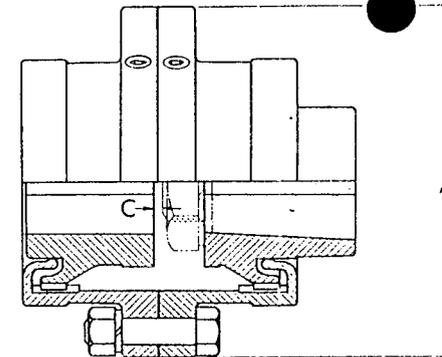
MODEL B and MODEL B MILL MOTOR

COUPLING SIZE		1	1½	2	2½	3	3½
GREASE CAPACITY (U.S. PINTS)	FULL FLEX	¾	1	1½	2¼	3¼	4½
	FLEX-RIGID	¾	1	1½	2¼	3¼	4½
	SPACER ONLY (per in. of length)	.05	.10	.15	.20	.30	.45
HUB SEPARATION—"C" & "CFR" (inches)		⅜	⅜	¾	¾	1¼	1¼
FLANGE O.D.—"A" (inches)		4	5	6	7	8½	9¾

DO NOT USE OIL WITH MODEL B

When a spacer is used (to increase shaft separation), additional lubricant is necessary. To the amount required for the FULL FLEX coupling, add the amount required for SPACER ONLY multiplied by the length of spacer in inches. For spacers with limited end float thrust plates and for floating shaft arrangements, each end must be separately lubricated. The capacity at each end is the same as the capacity for a flex-rigid coupling.

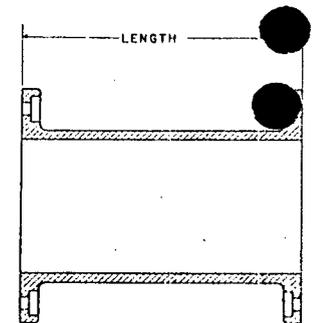
MILL MOTOR COUPLING



CAST STEEL

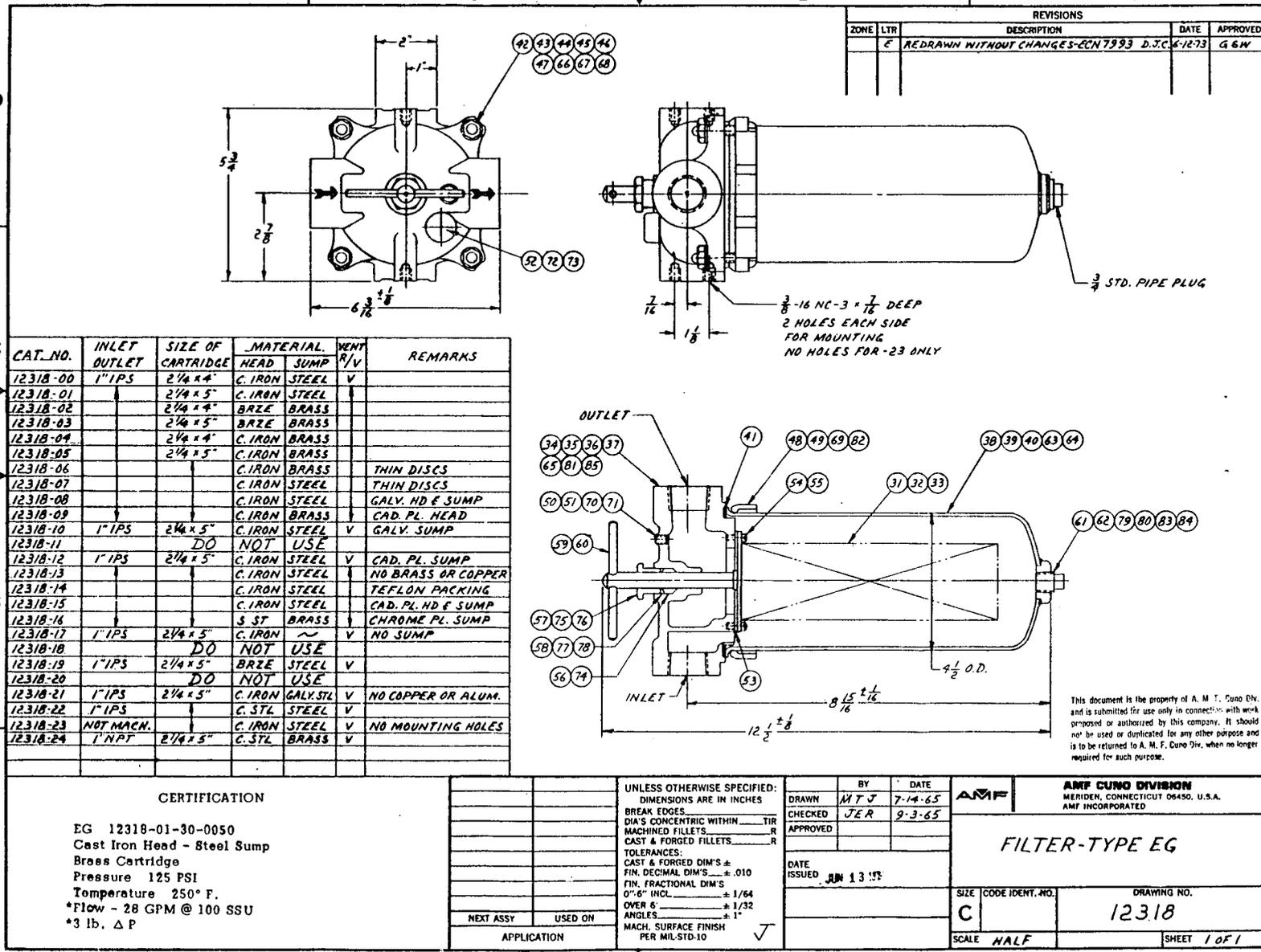
COUPLING SIZE		5½	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30		
GREASE CAPACITY (U.S. GALS.)	FULL FLEX	¾	1	1¼	1¾	2¼	3	3¾	4½	5½	6½	7½	8½	10	12	16½	20	23½	26	28	30	
	FLEX-RIGID	¾	1	1¼	1¾	2¼	3	3¾	4½	5½	6½	7½	8½	10	12	16½	20	23½	26	28	30	
	SPACER ONLY	SPACER CAPACITIES DEPENDENT ON INDIVIDUAL DESIGN																				
OIL CAPACITY (U.S. GALS.)	FULL FLEX	⅜	½	¾	1	1¼	1½	2	2¼	2¾	3¼	4	4½	5½	6	9½	11¼	13½	15	16½	19	
	FLEX-RIGID	⅜	½	¾	1	1¼	1½	2	2¼	2¾	3¼	4	4½	5½	6	9½	11¼	13½	15	16½	19	
	SPACER ONLY	SPACER CAPACITIES DEPENDENT ON INDIVIDUAL DESIGN																				
HUB SEPARATION—"C" (inches)		¾	¾	1	1	1½	1½	1½	1½	2	2	2	2	2	2	2	2	2	2	2	2	2
HUB SEPARATION—"CFR" (inches)		1½	1½	2	2	2½	2½	2½	2½	3	3	3	3	3	3	3	3	3	3	3	3	3
FLANGE O.D.—"A" (inches)		16¼	18	20¼	23¼	26	28	30½	33	35¼	38	40½	43	47½	53½	59	64½	68½	73¼	78		

SPACER



SPACER LENGTH + C = HUB SEPARATION

Use of excessive amounts of lubricant will not impair operation of the coupling. The excess lubricant will be thrown from the coupling during operation.



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