

BS4 Butt Fusion Machine

Butt Fusion Procedures



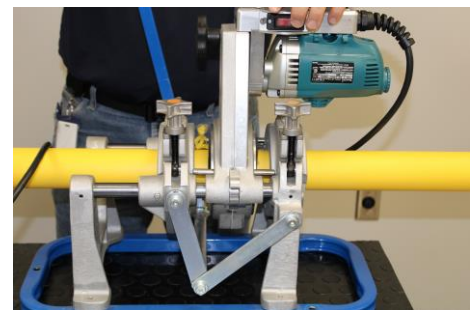
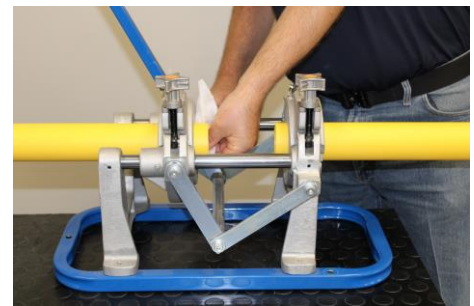
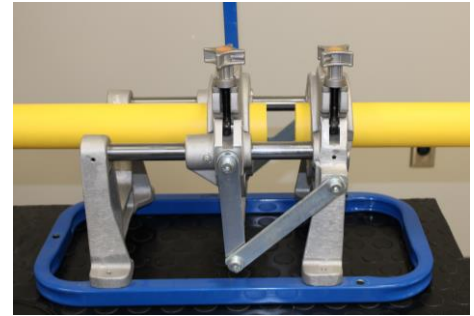
Required Tools:

1. Butt Fusion Machine
2. Trimming Device
3. Heating Tool
4. Butt Fusion Heating Faces

Pipe and Fitting Preparation:

1. Align pipe and fitting in a clamping device: Allow ends to protrude through clamps approximately 3/4" (19.050 mm) for facing purposes.
2. Clean pipe and fitting ends: Remove any dirt or foreign material from ends with a clean cloth.
3. Trim pipe and fitting ends: Place trimmer between pipe and fitting ends. Bring ends firmly against cutter blades and trim. A thin, continuous strip of material should be trimmed from both the pipe and fitting end. When the trimmer stops are against both clamps, ends should be completely faced. Pull ends away from cutter discontinue trimming, and remove the trimming tool.
4. Remove shavings: Be careful not to touch newly faced ends with your hands as perspiration or body oils could contaminate joining areas resulting in a weakened fusion joint.
5. Check pipe and fitting alignment: Bring ends together and carefully run your finger over the junction of the two ends to check for alignment and fit. Gaps between pipe ends should not exceed .010" (.25mm). If misalignment does occur, tighten clamp on end appearing to be larger in diameter. If adjustments are made, ALWAYS reface the pipe and fitting ends.

After pipe and fitting ends are properly faced and alignment adjustments are made, melt and fusion procedures should be started. It is important that heater faces are clean from contaminants and coating is free from scratches. Either of these conditions could result in a weakened fusion joint.



Fusion Procedures:

Heating tools should be preheated to pipe manufactures' recommendations. (GF Central Plastics follows ASTM F2620 Standards: 490°F to 510°F (254°C – 266°C). An accurate temperature reading for the heater may be obtained by checking the heater face with a pyrometer or templestix.

1. Place the heating tool between the pipe and fitting ends. Bring ends of pipe and fitting into contact with the heater and apply fingertip pressure only. Observe the melt bead as it develops. Maintain fingertip pressure for the required amount of time or until the proper bead size is achieved.

(Refer to Table 1 Bead Chart for bead thickness)

(Refer to Table 2 Fusion Time Cycle for PE2708)

(Refer to Table 3 Fusion Time Cycle for PE4710)

2. After proper bead is obtained (visually or by elapsed cycle time), remove heating tool being careful not to remove any molten material from the fusion areas. Quickly inspect ends for an even melt pattern.
3. Immediately bring ends together with enough force to obtain a roll back of each bead onto the pipe and fitting ends.
4. Joining pressure should be maintained or locked in place for recommended cooling times.

(Refer to Table 2 Fusion Time Cycle for PE2708)

(Refer to Table 3 Fusion Time Cycle for PE4710)

5. Inspect the entire circumference of the fusion joint for uniform roll back of the melt bead. The edges of the bead should be against the pipe and fitting.
6. The joint should remain in a secure position for an additional 3 minutes after cooling time. Allow an additional 10 minutes cooling time before subjecting the joint to bending, burying, pressure testing, or similar handling and backfill stress.



Pipe Size (IPS)	Bead Thickness (inches)
3/4"	1/16"
1"	1/16"
1 1/4"	1/16" to 1/8"
1 1/2"	1/16" to 1/8"
2"	1/16" to 1/8"
3"	1/8"
4"	1/8"
6"	3/16"
8"	3/16"

Bead Thickness chart shows approximate bead diameter after fusion.

Guideline Only: Exact time could vary depending on environmental conditions or fusion equipment use.

Table 2: Fusion Time Cycle PE2708			
Pipe Size (IPS)	Heating Time (sec.)		Cooling Time (sec)
	440°F ± 10°	500°F ± 10°	
3/4"	15	7	50
1"	20	10	50
1 1/4"	25	12	50
1 1/2"	40	15	60
2"	40	15	60
3"	50	20	80
4"	55	20	80
6"	90	40	150
8"	**	**	**

Table 2: Fusion Time Cycle PE4710		
Pipe Size (IPS)	Heating Time (sec.)	Cooling Time (sec)
	500°F ± 10°	
3/4"	12	50
1"	15	50
1 1/4"	18	70
1 1/2"	22	70
2"	25	70
3"	30	70
4"	35	90
6"	55	160
8"	**	**

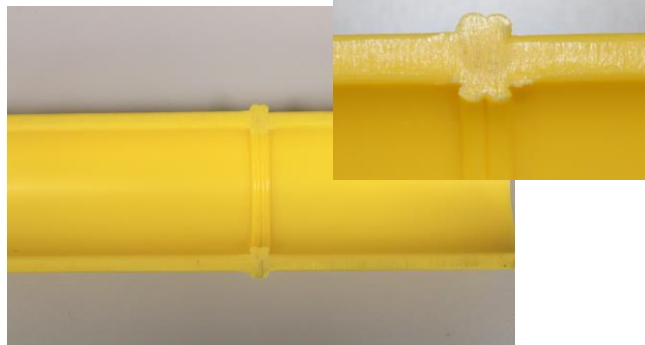
**Heating Cycle for 8" diameter and larger should be determined by bead thickness. (Refer to Table 1)

Butt Fusion Qualification:

1. Observe the joining process to determine that the proper procedure is followed.
2. Visually inspect the joint and compare it to a sample or photograph of an acceptable joint. (Refer to Figure 1 Acceptable Joint)
3. Allow the joint to cool for at least one hour before subjecting to a severe bend test.
 - a. Cut the sample through the joint area, lengthwise of the pipe, into at least three straps.
 - b. Visually examine the cut surface of the pipe wall at the joint for voids or unbonded areas.
 - c. Hold each strap at the end and bend the sample 180° (Refer to Figure 2 Bend Test)
 - d. Continue to hold sample in the bend position and thoroughly examine the entire fusion area. If any separation, cracks, or voids are observed, the fusion is considered defective.

If all bent samples are completely free of voids or gaps in the fusion area, the joint is considered satisfactory.

Acceptable Butt Fusion Joints:



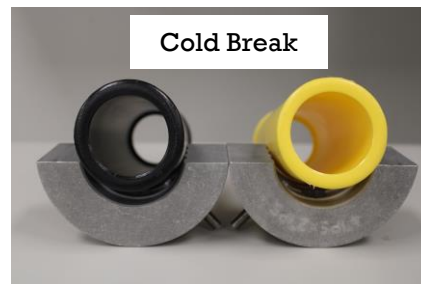
Unacceptable Butt Fusion Joints:



Incomplete Facing



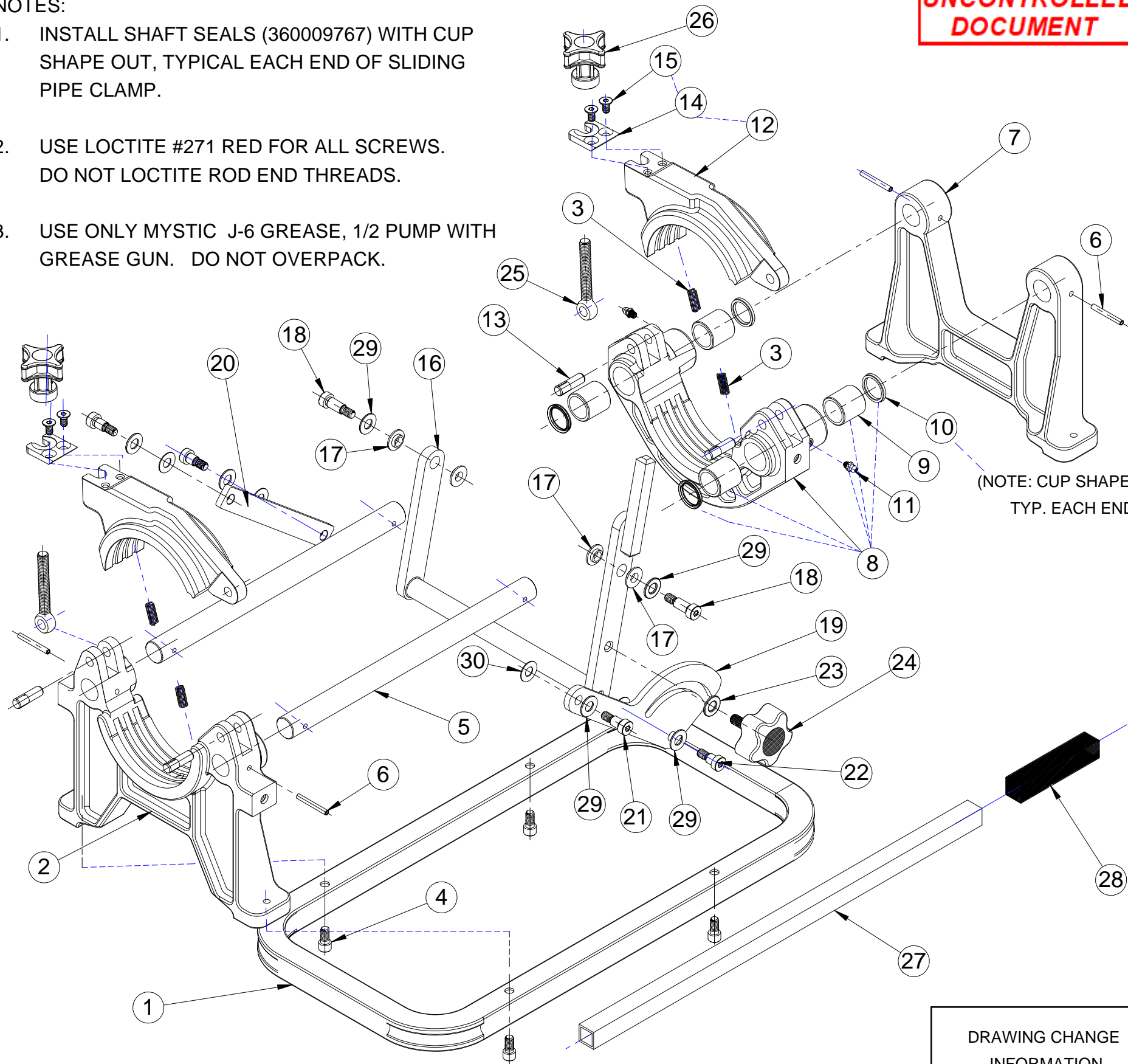
Poor Alignment



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NOTES:

1. INSTALL SHAFT SEALS (360009767) WITH CUP SHAPE OUT, TYPICAL EACH END OF SLIDING PIPE CLAMP.
2. USE LOCTITE #271 RED FOR ALL SCREWS. DO NOT LOCTITE ROD END THREADS.
3. USE ONLY MYSTIC J-6 GREASE, 1/2 PUMP WITH GREASE GUN. DO NOT OVERPACK.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	360005266	BASE FRAME BS4	1
2	360004229	FIXED PIPE CLAMP BS4 ASSEMBLY	1
3	360043082	SCREW THREAD INSERT, 1/4-20 UNC X 3/4 IN. LG, STAINLESS STEEL	4
4	360043094	FNSR,SCREW,CAP,,HEX SOCKET,5/16-18,UNC 2A,,.63 LG,,ALLOY	4
5	360009871	SLIDE RAIL FOR BS4 MACHINE	2
6	360043087	FNSR,SPRING PIN,SLOTTED,,.188 DIA.,,1.50 LG,,CARBON STEEL	4
7	360006409	END FRAME BS4	1
8	360004230	SLIDING PIPE CLAMP BS4 ASSEMBLY	1
9	360005289	BEARING NYLATRON	4
10	360009767	SHAFT SEAL .875 ID 1.129 OD 1/8 THICK CR #8620	4
11	360042991	ZERK GREASE 1/4-28 STRAIGHT 5/16 IN. HEX SIZE	2
12	360010519	TOP CLAMP BS4 ASSEMBLY	2
13	360008739	PIN GROOVED 3/8 DIA X 1 1/4 L PLATED	4
14	360003013	CASTING WEAR PAD 316 STAINLESS STEEL	2
15	360045321	FNSR,SCREW,CAP,FLAT HD,HEX SOCKET,1/4-20,UNC 3A,,.50 LG,,STAINLESS,,18-8	4
16	360006174	CROSSLINK ASSEMBLY BS4	1
17	360010763	WASHER SHOULDER BUSHING BS4, 3/8 ID x 3/4 OD x 1/4 THICK PLASTIC	4
18	360040549	BOLT SHOULDER, 3/8 DIA X .75 IN LONG, ZINC PLATED BRIGHT SILVER	2
19	360008313	LOCKING LINK BS4 MACHINE	1
20	360008284	LINK BS 4 MACHINE, ZINC PLATED	1
21	360040548	BOLT SHOULDER, 3/8 DIA X .50 IN LONG, ZINC PLATED BRIGHT SILVER	2
22	360005435	BOLT, SHOULDER, 3/8 X .38 IN LONG, 5/16-18 UNC 2A THREADS, ZINC PLATED	2
23	360040705	WASHER FLAT 3/8 USS PLATED	1
24	360008108	KNOB PLASTIC LINGAGE LOCKING 2 1/4 OD , 3/8-16 X 1 STUD	1
25	360003092	ROD END, 3/8-16 UNC 2A X 3 IN. LG.	2
26	360002940	KNOB TOP CLAMP ASSEMBLY BS4	2
27	360008628	OPERATING HANDLE BS4 MACHINE	1
28	360007002	GRIP, SQUARE, VINYL, 3/4 X 3/4 X 4 IN. LONG, BLACK	1
29	360006913	FNSR,WASHER,3/8 IN.,SAE,FLAT,,ZINC PLATED	6
30	360010760	WASHER FLAT, TEFLON, .380 I.D. X .81 O.D. X .031 THICK	4

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REV.	DESCRIPTION
E	CORRECTED PART NUMBER FOR 3/8" USS FLAT WASHER
D	REDRAWN WITH SAP PART NUMBERS; ADDED NOTE FOR LOCTITE SCREW THREADS PER ASSEMBLY DEPT.; WAS DRAWING NUMBER 557BS0400000_B_REV_C
C	CHANGE 3/8 SAE WASHER FROM 9000255 TO MORE USAGE ITEM 000435000400 PER ASSEMBLY DEPT.128
	REVISIONS

DRAWING CHANGE INFORMATION	
ECO #:	-
DATE:	-
MADE BY:	-
APPROVED BY:	-

TOLERANCE UNLESS NOTED:
 FINISH: 125
 ANGULAR: ± 2°
 FRACTIONS: -
 DECIMALS: .XX
 .XXX
 WEIGHT: 26.76 LB.
 SCALE: 1 : 2 & 1 : 4.25

+GF+ GF CENTRAL PLASTICS, LLC
 39605 INDEPENDENCE, SHAWNEE, OK 74804, USA

TITLE: **BUTT FUSION MACHINE BS4**

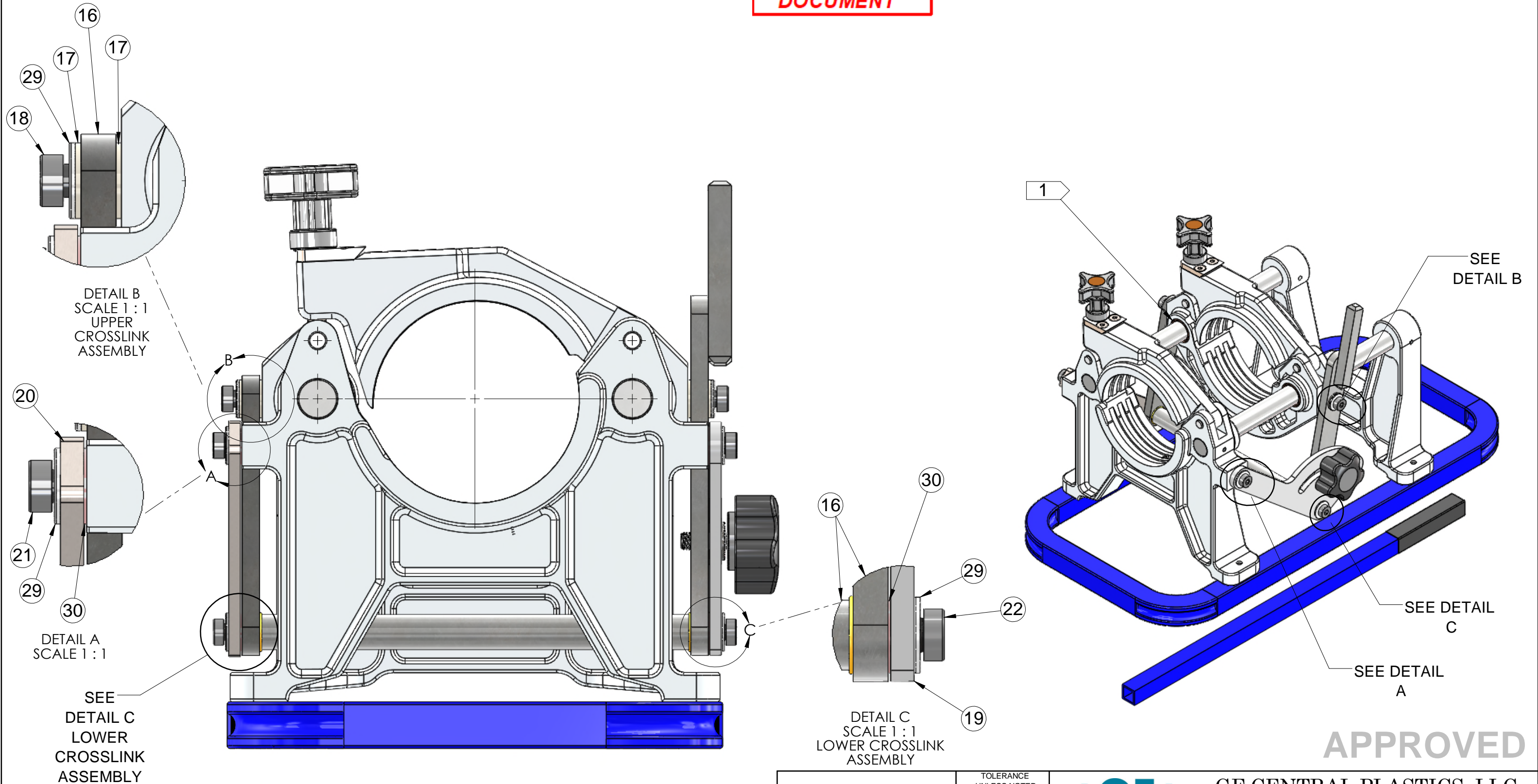
MATERIAL: SEE BILL OF MATERIALS

DRAWN BY: BW CHECKED BY: ME DRAWING NUMBER: 360000651 SIZE: B REVISION: E SHEET: 1 of 2

DATE: 30 MAR 2015 APPROVED BY: GF

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360000651



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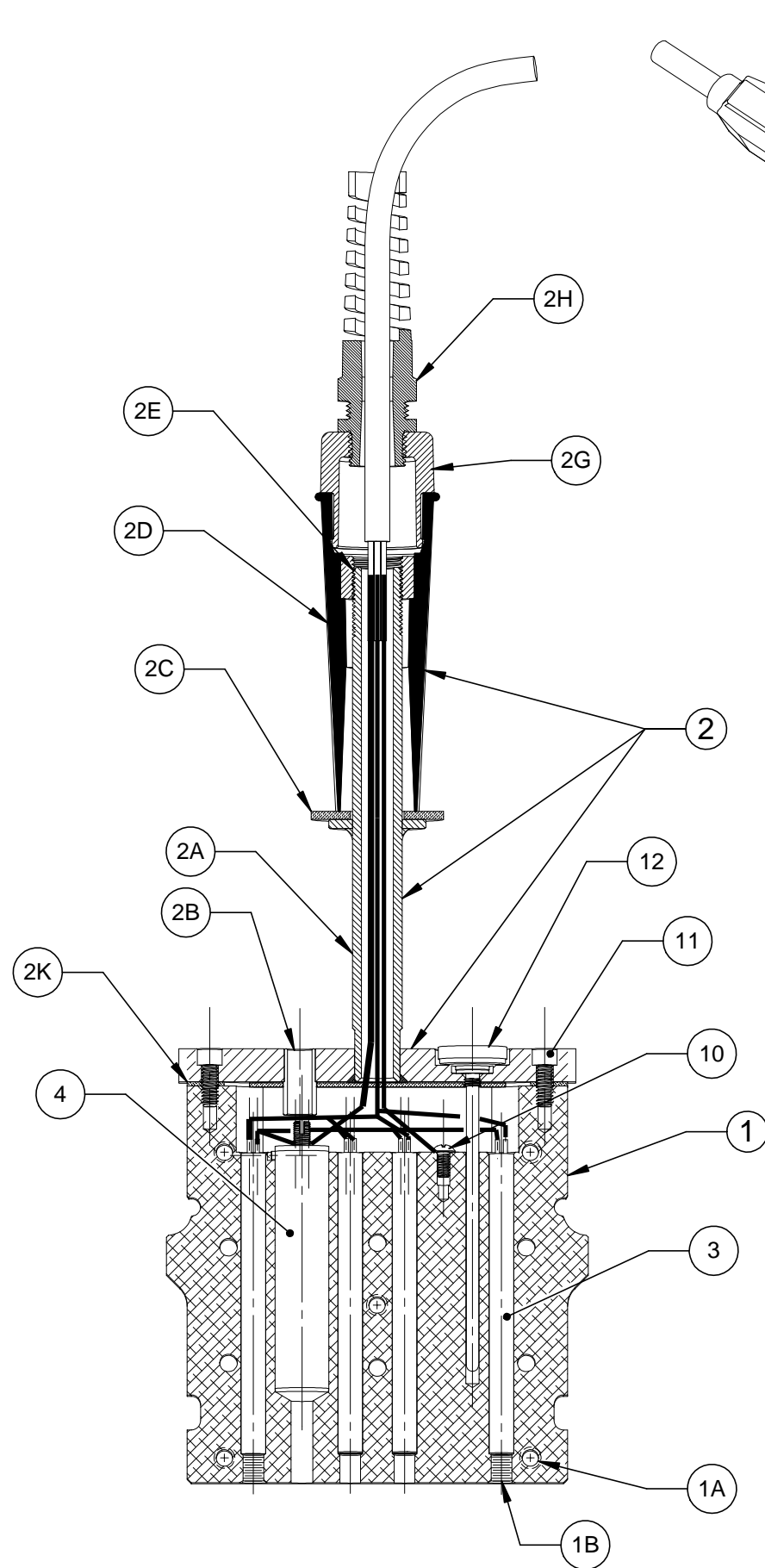
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DRAWING CHANGE INFORMATION	
ECO #:	-
DATE:	-
MADE BY:	-
APPROVED BY:	-

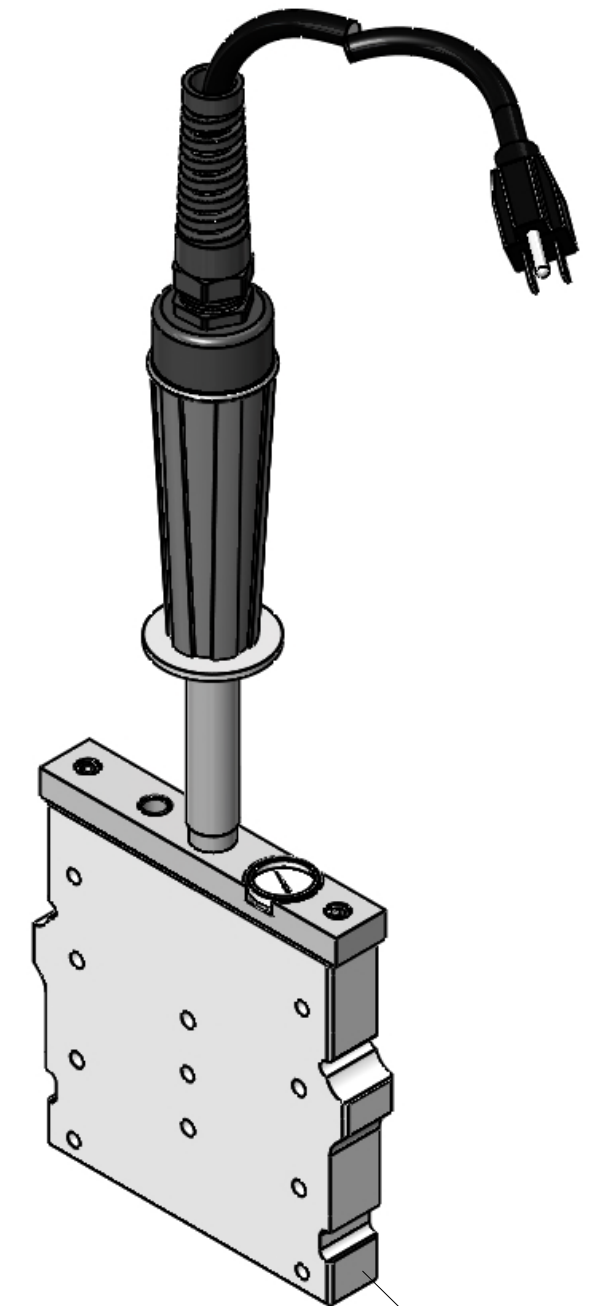
TOLERANCE UNLESS NOTED:		+GF+ GF CENTRAL PLASTICS, LLC	
FINISH:	125	39605 INDEPENDENCE, SHAWNEE, OK 74804, USA	
ANGULAR:	± 2°	TITLE: BUTT FUSION MACHINE BS4	
FRACTIONS:	-	MATERIAL: SEE BILL OF MATERIALS	
DECIMALS:	.XX	DRAWN BY: BW	CHECKED BY: ME
	.XXX	DATE: 30 MAR 2015	APPROVED BY: GF
WEIGHT:	26.76 LB.	DRAWING NUMBER: 360000651	SIZE: B
SCALE:	1:2 & 1:4.25	REVISION: E	SHEET: 2 of 2

FOR : BUTT, SOCKET, & SIDE WALL
FUSION (SERVICE & BRANCH)
120 Volt 1600 Watt

360001623



Item	Component	Item Description	UOM	Qty
1	360007180	HEATER BLOCK MODEL 4 SW ELECTRIC, WITH HELICOILS	EA	1
A	360043081	SCREW THREAD INSERT (HELICOIL), 1/4-20 UNC X 3/8 IN. LG	EA	10
B	36000391	SCREW THREAD INSERT (HELICOIL), 5/16-18 UNC X 5/16 IN. LG	EA	2
2	360007060	HANDLE ASSEMBLY MODEL 4 SW HEATER, HI-TEMP HANDLE, WIRED	EA	1
A	360010800	WELD ASSEMBLY HEATER HANDLE MODEL 4SW	EA	1
B	360009168	PROTECTIVE SLEEVE BUTT FUSION HEATER	EA	1
C	360010765	WASHER THERMAL 2 OD X 13/16 ID	EA	1
D	360007077	HANDLE MOLDED HEATER	EA	1
E	360043010	NUT HEX 3/4-16 UNF PLATED	EA	1
F	360006089	CORD, POWER SUPPLY, 8 FT. LONG, BLACK 15 AMP 125V	EA	1
G	360009160	PRESS LOCK CAP 1/2 NPT	EA	1
H	360010304	STRAIN RELIEF, CORD GRIP, FLEX FITTING	EA	1
J	360042972	TERMINAL SPADE FORK 16-14 GA #8 STUD NON INS	EA	1
K	360005267	BASE GASKET BUTT FUSION HEATER MODEL 4	EA	1
3	360007185	HEATER CARTRIDGE 3/8 X 4 1/2 IN. 120V-400W	EA	4
4	360003426	THERMOSWITCH .812 DIA X 3 3/4 25A-115V 100/600F	EA	1
5	360006027	CONNECTOR BUTT 10-12 GA NON-INSULATED	EA	1
6	360004033	CONNECTOR BUTT 14-16 GA NON-INSULATED	EA	2
7	360010629	TUBING , HIGH TEMP. ALPHA #PIF-200-4 (0.208 I.D.)	FT	.2708
8	360092445	SLEEVING, NATURAL SILICONE, COATED, # 602-PIF-200-9	EA	.0013
9	360003146	TAPE, FIBERGLASS, 3/4 INCH , HI TEMP, HI TACK, SILICONE, 3M	EA	.0303
10	360042981	SCREW #10-24 X 3/8 IN. PHP PLATED PAN HEAD PHILLIPS	EA	1
11	360043091	SCREW SOCKET HEAD CAP 1/4-20 X 5/8 STAINLESS STEEL	EA	2
12	360003414	THERMOMETER .187 STEM X 4.5 LONG X 1 DIAL 100-650F RANGE	EA	1
13	360041078	CARD, 'CAUTION' FOR FUSION HEATING TOOL	EA	1
14	360010752	WARRANTY; FUSION EQUIPMENT	EA	1
15	360005492	BOX 19 X 12 X 4, FOL, 200LB, GLUE JOINT, PRINTED	EA	1



STAMP
Mo. / Yr.

APPROVED

REF. INSULATION REPAIR
KIT 360029357

Georg Fischer Central Plastics, LLC Phone: 800 - 654 - 3872
39605 Independence St. 405 - 273 - 6302
Shawnee, OK. USA 74801 Fax: 800 - 733 - 5993
www.centralplastics.com 405 - 273 - 5993

DRAWING CHANGE INFORMATION		TOLERANCE UNLESS NOTED:		+GF+ GF CENTRAL PLASTICS, LLC	
ECO #:	-	FINISH:	125	39605 INDEPENDENCE, SHAWNEE, OK 74804, USA	
DATE:	-	ANGULAR:	± 2°	TITLE: HEATER MODEL 4SW ELECTRIC, 120V 1600 WATT	
MADE BY:	-	FRACTIONS:	-	MATERIAL: SEE BILL OF MATERIALS	
APPROVED BY:	-	DECIMALS:	.XX - .XXX -	DRAWN BY:	B.Wion
		WEIGHT:	5.66 LB.	CHECKED BY:	ME
		SCALE:	NTS	DRAWING NUMBER:	360001623
				DATE:	15 AUG 2019
				APPROVED BY:	BW
				SIZE:	B
				REVISION:	F
				SHEET:	1 of 1

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GF Fusion Plus Heating Tool:

WARNING: Do not adjust temperature above 575°F or 300°C. This can result in damage to the heater components and the non-stick surfaces.

The heater is to be used with AC power only. Check heater to confirm correct power requirements and only use a power source with the correct voltage and current capacity. Connect heater to power and permit sufficient preheating to stabilize the temperature. If temperature adjustment is needed, unplug the heater from the power source. Adjustment of the temperature when powered will damage the temperature control components. Insert the blade of the heater adjustment tool into the body of the heater and turn the thermoswitch adjustment screw. Turn the adjusting screw counterclockwise to increase and clockwise to decrease the temperature setting. Do not turn the screw more than a ¼ turn at a time. Reconnect to power and allow the heater to stabilize at the new temperature before further adjustments. One screw turn equals approximately 100°F.

CAUTION: When mounting faces on the heater cold, TIGHTEN SCREWS ONLY FINGER TIGHT. The difference in heat expansion between the aluminum of the heater body and steel of the screws is such that the threads in the heater body can be stripped if the screws are tightened hard, cold.

Heater Model No.: _____ Butt Plates: YES NO INSTALLED

Heater Serial No.: _____ Inspector Initials: _____

Factory Setting (°F): _____ Date Tested: _____

Parts Checklist:

360000630 Kit, BS4 Butt Fusion Machine, w/Electric Heater, BF Plates, Electric Trimmer, Liners for: 1 IPS, 1 ¼ IPS, 2 IPS and 3 IPS				
Item No.	Component No.	Item Description	Qty Each	Check if Included
1	360000651	BUTT FUSION MACHINE BS4	1	
2	360002656	TRIMMER, ELECTRIC MODEL MS4	1	
3	360001623	HEATER MODEL 4SW ELECTRIC	1	
4	360001624	HEATER MUFF W/ROPE	1	
5	360000650	BUTT FACE SET MODEL 4SW	1	
6	360001743	LINER KIT BS4 STANDARD 4 IPS X 1 IPS	1	
7	360001741	LINER KIT BS4 STANDARD 4 IPS X 1 ¼ IPS	1	
8	360001749	LINER KIT BS4 WIDE 4 IPS X 2 IPS	1	
9	360001750	LINER KIT BS4 WIDE 4 IPS X 3 IPS	1	
10	360042592	WRENCH, HEX KEY 5/32 IN., LOOP TEE	1	
11	360003053	PROMOBILE JOB CHEST, 24 GALLON	1	