

Jackman **FUSION EQUIPMENT™**

Plastic Pipe Butt Fusion Welding

INSTRUCTIONS

Jackman 26 Butt Fusion Machine

Welding capacity 2" IPS to 6" DIPS (63mm to 200mm)

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IMPORTANT:

Please read this operation manual carefully to ensure safe operation of the machine. Operators must follow the pipe manufacturers recommended joining procedures.

Jackman Fusion Equipment accepts no responsibility and cannot be held liable for the integrity or quality of the joints completed using this equipment. It is the operator's responsibility to ensure the pipe manufacturer joining procedures are followed, inspected, and tested.

Overview

The Jackman 26 plastic pipe butt welding machine is a mechanical butt fusion welder for joining various types of plastic pipe including HDPE and PPR. The Jackman model 26 Butt Fusion Machine is designed to butt fuse pipe sizes 2" IPS to 6" DIPS and MDPE (63mm to 200mm). It is easy to operate and incorporates a state-of-the-art heating plate, 4 clamp machine body, electric facer, and storage stand.

The Jackman 26 butt welding machine is intended for butt fusing HDPE or PPR thermoplastic pipe and fittings.

The main 4 clamp machine body is designed to fuse 200mm pipe without the need of inserts. Additional inserts are available to fuse the following pipe sizes: 2" IPS, 3" IPS, 4" IPS, 4" DIPS, 6" IPS, 6" DIPS, 63 mm, 75 mm, 90 mm, 110 mm, 125 mm, and 160 mm.



Machine Contents

1. 4 clamp mechanical machine body with digital load cell pressure gauge.
2. Electric facer 110 volts 800 watts.
3. Teflon coated heating plate with digital display and analog thermometer 110 volts 1800 watts.
4. Facer and heating plate storage stand



Technical

Total effective piston area TEPA = 1. The pressure ratio displayed on the gauge = 1 lb. of fusion force per square inch of pipe surface area.

Digital adjustable heating plate range: 394 – 534 degrees Fahrenheit or 200 – 279 degrees Celsius.

Total absorbed power requirement for the heating plate and facer combined is 2600 watts.

Heating Plate Operating Instructions

- Digital controller with temperature display screen including following keys: “RDY” and “HEAT” Indicator lamp, ↓key, ↑Key, ← key, and SET Key
- Heating Plate
- Analog Thermometer

Important

To switch between F Fahrenheit and C Celsius hold the SET button down and within 2 seconds press the down arrow .key once. Decimal point between the digits indicate the welder is set to Celsius.

Setting the temperature

Setting the temperature: Press the key “SET”. The unit will display the original set temperature. The unit figure (0-digit) will flash. By pressing the ↑Key or “↓Key, you can adjust the unit figure. To adjust the data on the decimal figure (00-digit), press the ←Key. Once the decimal figure begins to flash, press ↑Key or ↓Key to adjust. Press the ←Key to adjust the unit and decimal figure. The temperature range is fixed. The maximum is 534°F and the minimum is 392°F. Once the temperature setting is complete, press the “SET” key once again. The tool is ready to work.

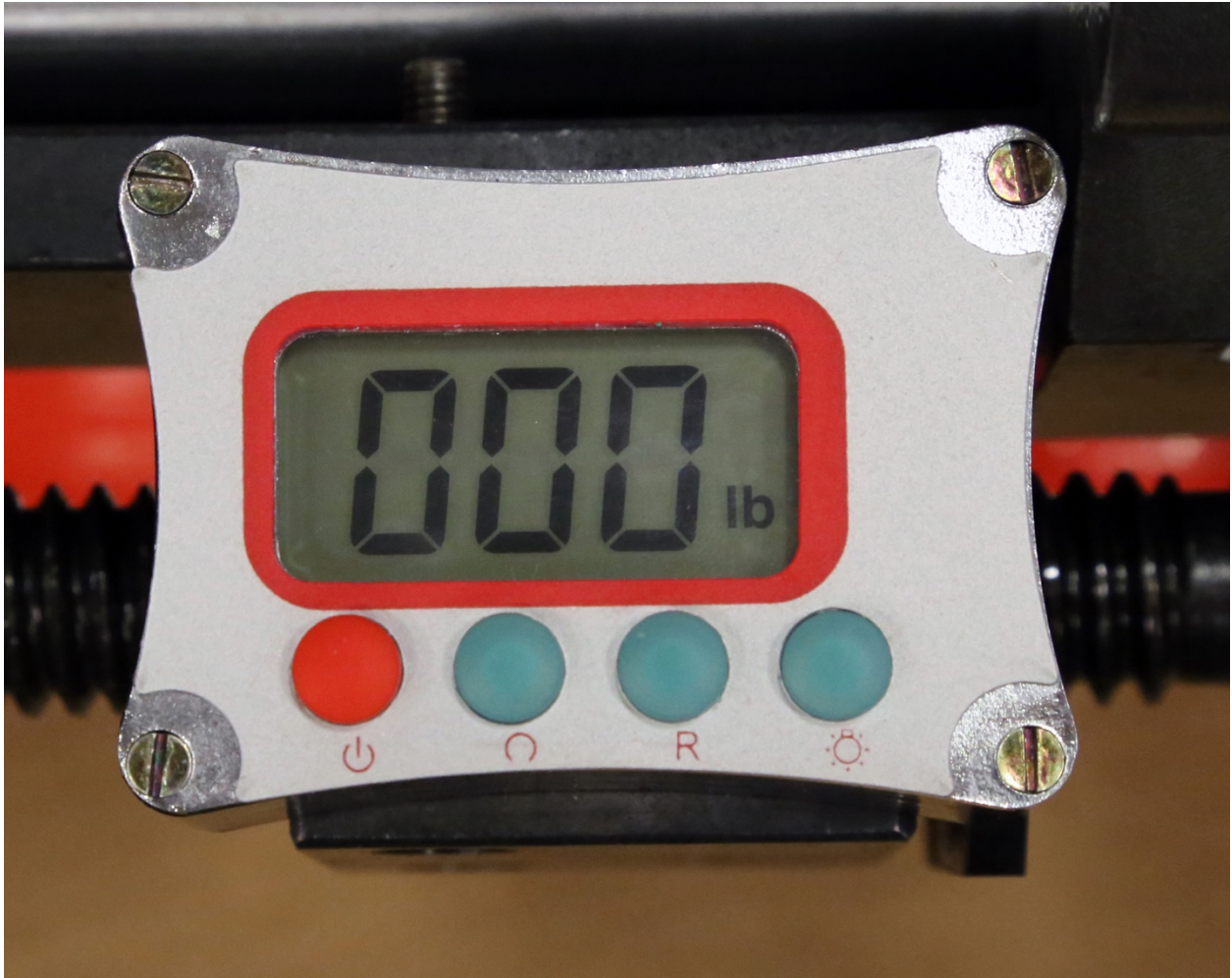
Over-heating alarm:

The tool will sound an alarm if the temperature rises above 534°F. If this happens, the power must be switched off. After troubleshooting, the tool can be turned back on.

Temperature compensates automatically:

This tool has a function that will automatically compensate for external temperature. When the external temperature drops below 44°F, the tool will increase the set temperature by 10°F. When the external temperature rises above 86°F, the tool will decrease the set temperature 8°F. If there is a wide fluctuation in external temperature, the tool temperature can be manually set to appropriate temperature.

Digital Load Cell Pressure Gauge



Power On / Off Mode KG/LBS Tear/Reset Light

Warning this gauge is **not** auto off. It is designed to stay on so that it doesn't shut off in the middle the fusion process.

Be sure to turn the gauge power off when not in use. To replace the 2 AAA batteries carefully remove the 4 screws on top of the gauge to expose the battery storage compartment.

Warning before each fuse be sure to verify you are set on LBS rather than KG.

Basic Welding Instructions

Do not exceed 1600 lbs. of fusion force. Excessive fusion force could damage your machine.

Pipe must be clean and free of any damage. Pipe with surface scratches that exceed 10 % of the pipe's wall thickness should not be used. 99% Isopropyl Alcohol should be used to clean the pipe before and after clamping pipe into the machine body. Allow alcohol to fully evaporate before facing pipe. Once the heating plate faces with isopropyl alcohol while the heating plate is cold.

Clamping: Insert the pipe into the clamps. Be sure to allow the ends of the pipe to protrude at least 1" beyond the inner clamp on each side. Tighten the clamps equally on each side to ensure the pipe is uniformly aligned. Do not overtighten carriage clamps. Overtightening clamps can crush the pipe and damage your machine. Once you have the pipe ends securely in place; clean the pipe ends with 99% isopropyl alcohol to remove any dirt or oils that may have gotten on to the pipe during this process.

Facing: Load the facer into the machine carriage. Turn the facer switch on and rotate the hand wheel on the machine counterclockwise to close. Apply just enough pressure to allow the facer blades to uniformly trim full ribbons of material. Complete this process by facing the pipe until the facer makes contact with the facer stops on each side. Turn the facer off and rotate the machine handwheel clockwise to remove the facer.

Alignment: Turn on the digital pressure gauge on the machine carriage and set the pressure reading to lbs. (pounds). Calculate your fusion pressure based on the pipe size and wall thickness you are working with. You may reference (**appendix A**) in this manual for further information on how to determine your required fusion pressure. Bring the pipe ends together by turning the handwheel counterclockwise. Apply your required fusion force to ensure the pipe is adequately secured in the machine clamps and does not slide or slip. Inspect the pipe joint to confirm that the pipe ends are in complete alignment all around the joint with no detectable gaps. If the pipe alignment is not acceptable you must remove the pipe from the clamps and start the clamping process over from the beginning. Once alignment is acceptable and you have verified that the pipe does not slide in the clamps when applying your specific fusion force for the pipe size you are working with you can move on to the heat soak process.

Heat Soak: Verify that the contact surface of the heating tool is maintaining the correct temperature. Place the heating tool between the pipe ends and move the pipe against the heating plate. Bring the component ends together and apply enough pressure to ensure full contact. The initial contact pressure should be held very briefly and released without breaking contact and once a melt bead is starting to form all around the pipe on both sides. Pressure should be reduced when evidence of melt appears on the circumference of the pipe. Hold the ends against the heating tool without force (drag force may be necessary to ensure contact). Beads of melted PE will form against the heating tool

at the component ends. When the proper melt bead size is formed, quickly separate the ends and remove the heating tool. The proper bead size is dependent upon the size of the pipe and wall thickness you are using. Approximate values are shown in (**appendix B**). During heating, the melt bead will expand out flush to the heating tool surface or may curl slightly away from the surface. If the melt bead curls significantly away from the heating tool surface, unacceptable pressure during heating may have occurred. Rotate the handwheel clockwise and remove the heating plate.

The maximum amount of time between heater plate removal and fusion joining is detailed in (**appendix D**). This removal time ranges between 8 and 15 seconds depending on wall thickness. This means you must move fast to remove the heater, inspect the pipe ends and immediately rotate the handwheel counterclockwise to bring the melted pipes together and up to your desired fusion pressure.

Fusion Joining: Immediately after the heating plate is removed quickly inspect the melted ends, which should be flat, smooth and completely melted. If the melt surfaces are acceptable, immediately and in continuous motion rotate the handwheel counterclockwise and apply the correct joining force or fusion pressure. Maintain the desired fusion force by carefully rotating the handwheel counterclockwise during this process to maintain pressure as the pressure will drop slightly as the resin is squeezed. Once the pressure stabilizes at your desired pressure you do not need to continue maintaining pressure with the handwheel. It is normal that the fusion pressure will continue to fall slightly as the joint begins to cool. The correct fusion pressure will form a double bead that is rolled over and contacts the pipe surface.

The final double roll back bead should be uniform and measure between the minimum and maximum widths detailed in (**appendix C**).

A concave melt is unacceptable; it indicates too much pressure during the heat soak. Do not continue. Allow the components ends to cool, cut the pipe, and start over.

Cooling: Allow the pipe joint to cool under pressure. **Cool for a minimum of 11 minutes per inch of wall thickness.** For ambient temperatures above 100F, longer cooling times may be required.

Once the cooling time is complete the pipe can be removed from the machine carriage. Avoid pulling, installation, pressure testing, and rough handling for at least an additional 30 minutes.

HOW TO CALCULATE FUSION FORCE FOR POLYETHYLENE PIPE (HDPE)

Jackman 26 Welder per ASTM2620 fusion welding guidelines

Call Jackman Fusion Equipment with questions 218-302-4470

$$\text{FUSION GAUGE PRESSURE} = (\text{OD} - t) \times t \times \pi \times \text{IFP} + \text{DRAG}$$

IFP (Standard Interfacial Pressure) 75psi

t = Pipe Wall Thickness $\text{OD}/\text{SDR} = t$

OD = Actual Outside Diameter

DRAG = Amount of pressure the machine requires to move the carriage. This pressure can be added to your calculated fusion pressure if the machine requires extra pressure to move the pipe with the handwheel.

Example: 6" IPS SDR11

6" IPS pipe = 6.625" actual outside diameter (OD)

SDR or DR Standard Dimensional Ratio = 11

Wall Thickness $t = 6.625/11 = .60$ inches

$$(6.625 - .60) \times .60 \times 3.14 \times 75 = 851$$

6" IPS SDR11 Polyethylene Pipe requires 851 lbs. of Gauge Pressure + Drag

Appendix A

GAUGE PRESSURE FOR POLYETHYLENE PIPE (excluding Drag Pressure)

	DR17	DR11	DR9	DR7
2" IPS	74	110	131	163
3" IPS	160	238	285	353
4" IPS	264	394	471	584
6" IPS	572	851	1021	1266
4" DIPS	300	448	536	664
6" DIPS	621	927	1107	1373

**DO NOT EXCEED 1600 LBS OF GAUGE PRESSURE. MACHINE DAMAGE MAY RESULT
THIS CHART APPLIES TO JACKMAN 26 WELDER ONLY. 1 lb on the gauge = 1 psi of force**

Appendix B

Approximate Melt Bead Size per Wall Thickness

Approximate Wall Thickness, Inches	Melt Bead Size (Approximate)
0.15 or less	1/32" – 1/16"
0.15 – 0.30	1/16"
Above 0.30 – 0.75	1/8" – 3/16"
Above 0.75 – 1.15	3/16" – 1/4"
Above 1.15 – 1.60	1/4" – 5/16"
Above 1.60 – 2.20	5/16" – 7/16"
Above 2.20 – 3.00	7/16" – 9/16"

This is the approximate melt bead size that should form against the heating plate during the heat soak cycle.

For example: When working with 6" IPS SDR11 pipe which has a wall thickness of 0.60" the approximate melt bead should be between 1/8" and 3/16" wide before the heating plate is removed.

Appendix C

Final Fusion Bead Widths per Wall Thickness

Wall Thickness inches	Final Double Bead Width Minimum	Final Double Bead Width Maximum
.118	5/32"	1/4"
.157	5/32"	9/32"
.197	3/16"	5/16"
.246	1/4"	11/32"
.315	9/32"	3/8"
.354	5/16"	7/16"
.433	11/32"	1/2"
.512	3/8"	9/16"
.630	7/16"	19/32"
.710	1/2"	5/8"
.750	1/2"	11/16"
.870	1/2"	11/16"
.940	9/16"	3/4"
1.06	19/32"	25/32"

For example, 6" IPS SDR11 pipe which has a wall thickness of 0.60" the appropriate double melt bead after fusion should be 7/16" – 19/32" wide.

Appendix D

Maximum Heater Plate Removal Times (in seconds)

Pipe Wall Thickness, inches	MAX DURATION OF PLATE REMOVAL
0.20" to 0.36"	8 Seconds
0.36" to 0.55"	10 Seconds
0.55" to 1.18"	15 Seconds

For example 6" IPS SDR11 and pipe which has a wall which has a wall thickness of 0.60" the total time allowed to remove the heating plate is no more than 15 seconds.

Clamp Positioning Bar

NOTE: Be sure bars are installed and tight on both sides of the machine before operating.

For welding pipe to pipe: (Image A)

Connect the links between the first two clamps on each side of the machine when welding pipe to pipe joints. The threaded holes are located on the front edge of each side of the first 2 clamps.

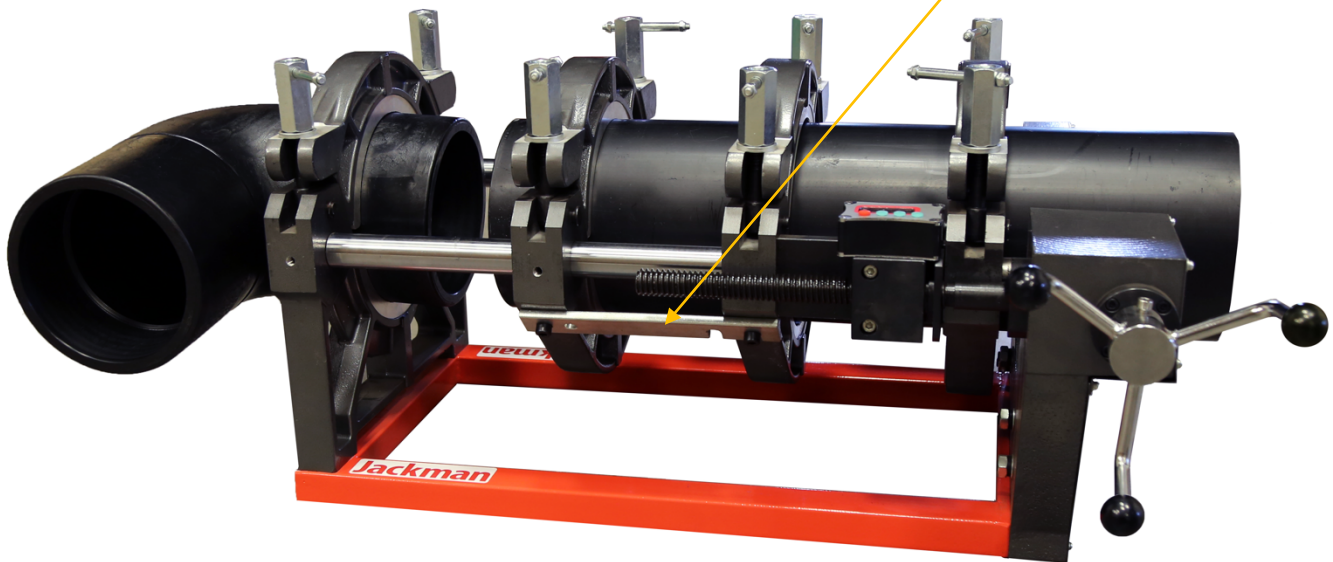
For welding pipe to fitting: (Image B)

Connect the links between the two center clamps when welding flanges, elbows, tees and wyes. The threaded holes are located on each side of the center 2 clamps along the 45deg angled casting underneath the front edge.

Image (A) Position Bar location for welding pipe to pipe.



Image (B) Position Bar location for welding fittings.



Safety Warnings

Do not exceed 1600 lbs. of fusion gauge pressure. Excessive fusion force could damage your machine.

Danger



This machine is not to be used in the presents of flammable materials, explosive gases, chemical containments, or excessive dust.



Electric motors and electric heating plates are NOT explosion proof.



Facer Blades are sharp. Do not attempt to remove pipe shavings while the facer is running.



Heater is very hot. Wait until the heating plate has completely cooled down before storing the equipment inside a structure or vehicle. Never leave the heating plate plugged in while unattended.



Proper Wear

Do not wear loose clothes or decorations. They may become entangled in the machine and cause injury.



Handling

This equipment is to be operated by qualified personnel only, use of this equipment by non-qualified personnel can be dangerous to the operator or others.

Operator must wear gloves and correct PPE. Heating plate must be placed into the storage support after heating After the heating plate is completely cooled, place the storage support in a suitable place with warning notice. Never touch the heater plate faces, they are hot.

Before facing, clean the pipe ends to prevent dirt from damaging the blades. Make sure the facer's is locked in place before commencing to face the pipe. Always return the facer to the original storage place.

Note: Never adjust the clamps while the facer is running.

Warranty

JACKMAN FUSION EQUIPMENT Jackman Fusion Equipment is warranted to the original purchaser only to be free from defects in material and workmanship for a period of two (2) years after the date of purchase for Socket Fusion and Butt Fusion Equipment and (1) year after purchase for Electrofusion Equipment unless otherwise noted. Subject to certain exceptions**, Jackman will repair or replace any defective part including electronics after examination, is determined by Jackman to be defective in material or workmanship for a period of two (2) years after the date of purchase unless otherwise noted. Return of the welder to Jackman Fusion Equipment Service Center or freight prepaid is required. A copy of the proof of purchase should be included with the return product. This warranty does not apply to damage that Jackman Fusion Equipment determines to be from repairs made or attempted by anyone other than Jackman authorized personnel, misuse, alterations, abuse, normal wear and tear, lack of maintenance, or accidents.

****NOTE:** This warranty does not cover Teflon coatings on heating adapters, pipe cutter blades, chamfer tool blades, consumable parts, water damage or normal wear and tear.

ACCEPTANCE OF THE EXCLUSIVE REPAIR AND REPLACEMENT REMEDIES DESCRIBED HEREIN IS A CONDITION OF THE CONTRACT FOR THE PURCHASE OF JACKMAN FUSION PRODUCT. ;IF YOU DO NOT AGREE TO THIS CONDITION, YOU SHOULD NOT PURCHASE THE PRODUCT. IN NO EVENT SHALL JACKMAN FUSION BE LIABLE FOR ANY INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR FOR ANY COSTS, ATTORNEY FEES, EXPENSES, LOSSES OR DELAYS ALLEGED TO BE AS A CONSEQUENCE OF ANY DAMAGE TO, FAILURE OF, OR DEFECT IN ANY PRODUCT INCLUDING, BUT NOT LIMITED TO, ANY CLAIMS FOR LOSS OF PROFITS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES, WRITTEN OR ORAL. TO THE EXTENT PERMITTED BY LAW, JACKMAN FUSION DISCLAIMS ANY IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE; TO THE EXTENT SUCH DISCLAIMER IS NOT PERMITTED BY LAW, SUCH IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THE APPLICABLE EXPRESS WARRANTY AS DESCRIBED ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU, THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE

Warranty Receipt

Must mail Jackman a copy to register warranty

Customer's name _____

Telephone _____

Purchase date _____

Name of Distributor Who Sold You The Machine _____

Address _____

Serial # _____

Model _____

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