



HAYES COMBAT PROX Series Butt Fusion Machines Instruction Manual

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HAYES COMBAT PROX Series Butt Fusion Machines



Specifications

- Machine type: Manual Butt Fusion Machine
- Series: COMBAT PROX
- Suitable for: Butt fusion pipes and fittings made of HDPE and any other kind of thermoplastic pipes
- Components: Pipe alignment carriage, insert sets, Teflon-coated heating plate, electric trimmer, and electric stand
- Standard: Designed and manufactured according to the American international standard (Inches) ASTM F2620
- Operation: Rugged, reliable, and manually-operated
- Capacity: Capable of fusing pipe consistently with high-quality results
- Operator: Requires only one operator
- Maintenance: Minimal maintenance
- Additional inserts: DIPS and Metric pipe inserts available (sold separately)

Product Usage Instructions

Safety Information

The Hayes manual COMBAT PROX series butt fusion machines should only be operated by trained personnel. The machine can be dangerous if not used properly. It is important to carefully read and understand all sections of the manual before operating the machine.

Machine Setup

Follow these steps to set up the butt fusion machine:

1. Ensure the machine is placed on a stable surface.
2. Connect the electric stand to a power source.
3. Attach the pipe alignment carriage to the machine.

4. Insert the appropriate insert sets for the pipe size being fused.
5. Ensure the Teflon-coated heating plate is clean and in good condition.
6. Make sure the electric trimmer is securely attached.

Fusion Process

Follow these steps to perform the fusion process:

1. Prepare the pipe ends by removing any dirt or debris.
2. Align the pipe ends using the pipe alignment carriage.
3. Activate the heating plate and wait for it to reach the desired temperature.
4. Bring the pipe ends into contact with the heating plate and apply pressure.
5. Hold the pipe ends in place until the fusion process is complete.
6. Trim any excess material using the electric trimmer.

Maintenance

To ensure the longevity of the butt fusion machine, regular maintenance should be performed:

1. Clean the machine after each use to remove any residual materials.
2. Inspect the heating plate and electric trimmer for any signs of damage.
3. Replace any worn or damaged parts as necessary.
4. Keep the machine stored in a dry and secure location when not in use.

FAQ

- Q: Can I use this machine with pipes other than HDPE?
A: Yes, the COMBAT PROX series is suitable for butt fusion pipes and fittings made of HDPE and any other kind of thermoplastic pipes.
- Q: Are additional inserts available for different pipe sizes?
A: Yes, additional DIPS and Metric pipe inserts are available and sold separately.
- Q: What safety precautions should I take when operating the machine in an explosive atmosphere?
A: Both the heater element and the trimmer with electric motor are not explosion-proof. If operating in an explosive atmosphere, the heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion. Operating the heater in an explosive atmosphere without necessary safety precautions can result in serious injury or death.

Welcome to the Hayes Family!

The Hayes manual COMBAT PROX series butt fusion machines will give many years of service if operation procedures and maintenance are followed carefully and correctly.

- The COMBAT PROX series is suitable for butt fusion pipes and fittings made of HDPE and any other kind of thermoplastic pipes.
- Machine consists of pipe alignment carriage, insert sets, Teflon-coated heating plate, electric trimmer and electric stand.

- Designed and manufactured according to the American international standard (Inches) ASTM F2620.
- This machine is rugged, reliable and manually-operated. Capable of fusing pipe consistently with high-quality results.
- This machine requires only one operator and minimal maintenance.
- Additional DIPS and Metric pipe inserts are available and sold separately
- Do not operate this machine until you have carefully read, and understand all the sections of this manual.

About this manual

This manual is only a manufacturer's guide. It does not take the place of proper training by qualified instructors. The information in this manual is operational and cannot cover all the situations that may appear in the field. This guide does not exceed the experience of a professional.

IMPORTANT Safety Information

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alerts are shown below

- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury

Signal words "NOTICE" and "IMPORTANT" are used to bring attention to important information. The meaning of these signal words are as follows:

"NOTICE" – Can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

"IMPORTANT" – Can help you do a better job or make your job easier in some way

California Proposition 65 Label

- The California Office of Environmental Health Hazard Assessment (OEHHA) amended regulations related to "clear and reasonable" Proposition 65 warnings ("Warning") went into effect August 30, 2018. For HAYES machines which are sold into and/or operated within California, the included label must stay attached to the machine. The purpose of Proposition 65 is to ensure the public is informed about potential exposures to chemicals which the state of California has determined can cause cancer, birth defects, or other reproductive harm.
- The list now includes more than 900 chemicals. HAYES machines are safe, stable and non-toxic under normal condition and when handling correctly, but may contain a trace amount of listed compounds as a result of our manufacturing processes. The requirements for Prop 65 warnings have evolved, however, and these warnings are now required for California equipment.
- For more information about Proposition 65, go to www.P65warnings.ca.gov

NOTICE: All data in this Operator's manual is offered in good faith as typical values. The information was compiled from data supplied by the vendors of the components of this machine and is believed to be accurate. It is the user's responsibility to determine the safety, potential hazard, toxicity, and suitability for their own use of the machine described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied, is made by HAYES INDUSTRIAL SOLUTIONS INC as to the effects of such use, the results to be obtained, or the safety, potential hazard and toxicity of the product, nor does HAYES INDUSTRIAL SOLUTIONS INC assume any liability arising out of use, by others, of the product referred to herein. The information is intended

only to assist in the safe handling of this machine.

Industrial Safety RISK MATRIX

- Avoid serious Injury: This unit must be operated by trained personnel only.
- Skill and knowledge are required to proper use this equipment.
- Improper operation, maintenance or repair of this product can be dangerous and could result in injury or death.
- Be alert and report anything that you see, feel, smell or hear differently than expected, or that you think is unsafe.

HAZARD	RISK	SOURCE	RISK CONTROL
MECHANICAL	Cutting Risk	Trimmer	<ul style="list-style-type: none"> · Maintain a safe distance during trimming. · Keep hands and fingers away from the trimmer blades when it is running. Trimmer blades are extremely sharp. · Wait for the trimmer to come to a complete stop before removing it from the alignment carriage.
ELECTRICAL	Electrocution Risk	Heater	<ul style="list-style-type: none"> · Ensure you are using the correct power source.
		Trimmer	<ul style="list-style-type: none"> · Confirm electrical cords are in good condition. · If you are working in a wet environment, proper ground connections help to minimize the chances of an electric shock. Use GFCI electrical connection if possible. · Do not allow the cables to come into contact with chemical agents, water or mechanical stress.
THERMAL	Risk of Fire	Heater	<ul style="list-style-type: none"> · Do not use the machine in environments with explosion risk (due to the presence of gases, flammable vapors, etc.).
		Trimmer	<ul style="list-style-type: none"> · Ensure to keep out any material that could deteriorate or ignite with the heater or with the combustion of the heater such as: oil, solvents, paints or varnishes, etc.
	Burn Risk	Heater	<ul style="list-style-type: none"> · Wear protective gloves and eyewear. When the heater is on it will burn clothing and skin. · Never touch the surface of the heating element when it is on. Wait until it completely cooled down. · Carefully clean the heating plate with a dry lint free non-synthetic cloth. · Move the heating plate cautiously.
ERGONOMIC	Injury Risk	Weight	<ul style="list-style-type: none"> · Move the large parts of the equipment correctly. · Use the appropriate industrial safety positions for cargo handling.

Both the heater element and the trimmer with electric motor are NOT EXPLOSION PROOF. If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

Parts of the butt fusion machine

Teflon-coated heating plate

The heater is coated to reduce polymer adhesion. The heater temperature is controlled by a microprocessor installed in the electric box located in the stand



Electric Trimmer

This is a heavy-duty trimmer with a robust electric motor. It will establish clean, parallel mating surfaces perpendicular to the centerline of the pipes



Pipe alignment carriage

Pipe support stands are used to support the pipe at both ends of the butt fusion machine to assist with pipe loading and alignment.



Stand for heating plate and trimmer

This stand is not only for holding the heater and the trimmer but also for connecting them and control the temperature of the heater



Specifications

MODEL	COMBAT6PROX 110 V	COMBAT8PROX 220 V
Pipe ranges	2" IPS – 6" IPS 2" 3" 4" 5" + 6" MASTER	2" IPS – 8" IPS 2" 3" 4" 5" 6" 8" + 250mm MASTER
Complete set of inserts Working temperature Displayed	0-518 °F Fahrenheit 110V / 1-phase 50/60 Hz	0-518 °F Fahrenheit 220V / 2-phase 50/60 Hz
Voltage Frequency	23-113°F	23-113°F
Environment temperature Difference Temp. Heater	± 41°F	± 41°F
Power Requirements Heating plate Trimmer	1300 watts / 12.5 Amps 900 watts / 8.5 Amps	2200 watts / 19.5 Amps 1700 watts /15 Amps 500 watts /4.5 Amps NEMA L14-30
Plug type	400 watts / 4 Amps NEMA 5-15 (USA)	
Shipping/Packing Wood crate		
Weight and Dimensions LxW xH	GW: 168 lbs. (76Kg) NW: 132 lbs. (60Kg) 42" x 20" x 27"	GW:264 lbs. (120Kg) NW: 202 lbs. (92 Kg) 42" x 22" x 29"
*cm	*(108x53x70 cm)	*(108x56x73 cm)

Other available inserts

- DIPS Inserts 3" DIPS – 4" DIPS suitable for COMBAT 6
- DIPS Inserts 3" DIPS – 8" DIPS suitable for COMBAT 8

- mm Inserts 63mm – 140mm suitable for COMBAT 6
- mm Inserts 63mm – 250mm suitable for COMBAT 8

Instruction of use



Before operation make sure of the following:

- Skill and knowledge are required to obtain a good quality joint.
- The machine should be placed on a stable and dry plane to operate.
- Check field generator for adequate power supply and fuel sufficient to complete the fusion joint.
- Make sure the blades of the trimmer are sharp and the Teflon in the heating plate is in good condition.
- Ensure you select the proper temperature according to the pipe manufacturer's recommendation.
- pyrometer or other surface temperature measuring device should be used periodically to ensure proper surface temperature of the heating tool plate.
- Place the appropriate inserts for the pipe OD or the fitting being fused.
- Pouring water or applying wet cloths to the joint to reduce cooling time is not acceptable.

Non-stick coating

Coated surfaces have been treated to reduce polymer adhesion. If the polymer adheres to the heating plate, lightly wipe with a clean cotton cloth to remove. Do not use a wire brush or an abrasive.

Welding parameters

Pipe manufacturers have established qualified fusion procedures which should be followed precisely. You should obtain a copy of the pipe manufacturer's procedures or appropriate joining standard for the pipe being fused.

Heater temperature

To meet pipe manufacture's temperature specifications, the surface temperature of the heating plate should be measured with a surface pyrometer prior to initial use and at reasonable time intervals thereafter.

Temperature controller setting

- Switch on
- Press "SET" for more than 4 seconds until "Sd" is shown in the upper window
- Press "△" or "▽"key. Enter the setting temperature. Press "SET" to confirm

Deviation correction of temperature control instrument

- Switch on



- Press “SET” for more than 3 seconds till “SI” is shown in the upper window



- Press “SET” until “SC” is shown in the upper window



- Press “△” or “▽”key, enter temperature correction value, press “SET” key to confirm

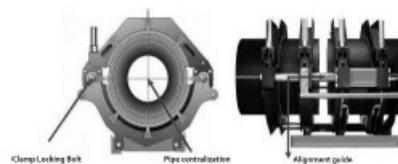


Welding procedure

Description of Method

The principle of Butt fusion is to heat two surfaces to a designated temperature, then fuse them together by application of a sufficient force. This force causes the melted materials to flow and mix, thereby resulting in fusion.




The butt fusion procedure has 4 stages:



- Stage #1: Pipe Preparation
 - Cut and Clean
 - Trim
 - Align
- Stage #2: Heating cycle
 - Preheat

- Heating up
- Stage #3: Welding
 - Welding time
 - Cooling time
- Stage #4: Removing Pipe
 - Inspecting

Pipe Preparation

Cut and Clean	Trimming pipes	Alignment
		
<p>Cut the pipe and clean the inside and outside of both ends of the pipes with a clean lint-free dry cloth. Remove all dirt from the clamps surfaces where the pipes will be clamped in the butt fusion machine.</p>	<p>Face the pipe ends until the trimmer bottoms out on the stops and is locked between the clamps to establish clean, parallel mating surfaces between the pipe ends. Open the clamps, remove the trimmer and clean the inside and outside of both ends of the pipes with a clean lint-free dry cloth.</p>	<p>Check the pipe ends for high low alignment and out-of-roundness. If adjustment is needed, adjust the high side down by tightening the high side clamp. Do not loosen the low side clamp or slippage may occur during fusion. Re-face the pipe ends if excessive adjustment is required and remove any dirt with a clean, lint-free cotton cloth. The maximum OD high- low misalignment allowed in the butt fusion procedure must be less than 10% of the pipe minimum wall thickness.</p>

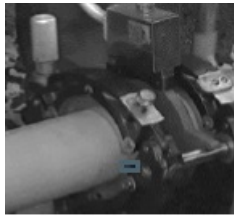
Heating cycle

- Preheat: Verify that the heater surface temperatures are in the specified temperature range according to the standard. Please follow pipe manufacturer’s procedure. A pyrometer or other surface temperature measuring device should be used before the first joint of the day and periodically throughout the day to insure proper temperature of the heating tool plate.



The thermometer on the electric box indicates internal temperature of the heater which varies from the actual surface temperature.

- Place the Heater: Place the heating tool in the butt fusion machine between the pipe ends. The heater must be clean and must have its Teflon coating in good condition



NOTICE: Incorrect heating temperature can result in questionable fusion joints.

Welding



Bring the pipe ends into full contact with the heating tool at fusion force.

After the heating cycle is completed and a slight melt is observed around the circumference of the pipe, maintain contact without force, while a bead develops between the heater and the pipe.

Remove the heater and quickly apply fusion force with the lever handle in accordance with the pipe manufacturer's recommended fusion procedure or appropriate joining standard. The quicker you can safely do this process, the better.

A torque wrench can be used when a specified Interfacial Pressure is required. Hold this force for at least 10 seconds. After 10 seconds, the locking cams will assist by maintaining jaw position during the cooling cycle.

An interfacial pressure of 60 to 90 psi (0.41 to 0.62 Pa) is used to determine the force required to butt fuse the pipe components. Multiply the interfacial pressure times the pipe area to calculate the fusion force required (lb).

For manually operated fusion machines, enough force should be applied to roll the bead back to the pipe surface.

A torque wrench may be used to apply the proper force. Manual fusion without a torque wrench has been used successfully by many gas utilities.

NOTICE: Failure to follow pipe manufacturer's heating time, pressure and cooling time may result in a bad joint

Removing Pipe

After pipe has cooled sufficiently, apply closing force on the lever handle and push the locking cams down into the unlocked position. Unscrew the clamp knobs enough that they can be swiveled outward. Inspecting: Visually

check the entire joint. The joint should be smooth symmetry, and the bottom of groove between the beads should not be lower than the pipe surface. The misalignment of two beads should not exceed 10% of the wall thickness.

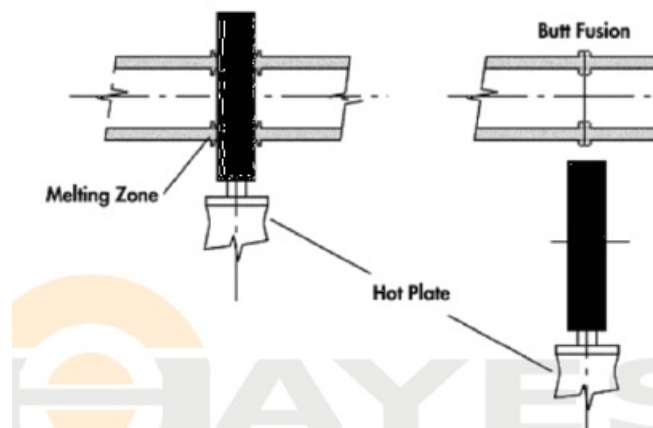


Reference Welding Standard

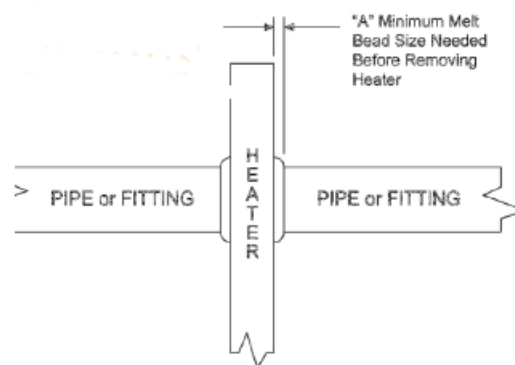
According to the ASTM F 2620

Pipe and fitting manufacturers have established qualified fusion procedure which should be followed precisely.

You should obtain a copy of the pipe manufacturer's fusion procedures or appropriate joining standard for the pipe being fused. Follow the procedure carefully and adhere to all specified parameters

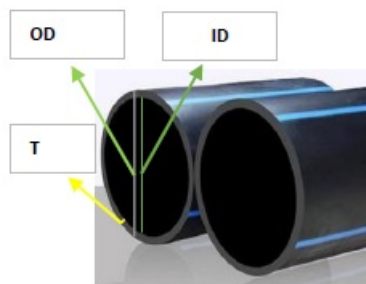


Outside Diameter in. (mm)	Minimum Bead Size in. (mm)
< 2.37 (60)	1/32 (1)
≥2.37 (60) < 3.5 (89)	1/16 (1.5)
>3.5 (89) < 8.62 (219)	3/16 (5)
> 8.62 (219) to < 12.75 (324)	1/4 (6)
> 12.75 (324) to ≤ 24 (610)	3/8 (10)
> 24 (610) to < 36 (900)	7/16 (11)
> 36 (900) to ≤ 65 (1625)	9/16 (14)



Maximum Heater Plate Removal		Heat soak time	Cooling time
Wall Thickness	Seg	4.5 min (270 s) for	11 min (660 s) per inch
in. (mm)		every inch (25.4	(25.4 mm) of pipe wall
0 – 5	4	mm) of pipe wall	thickness.
0.20 to 0.36 (5 to 9)	8	thickness.	For ambient temperatures
>0.36 to 0.55 (9 to 14)	10		100°F and higher,
>0.55 to 1.18 (14 to 30)	15		additional cooling time
>1.18 to 2.5 (30 to 64)	20		may be needed.
>2.5 to 4.5 (64 to 114)	25		

Terminology



- $F = IFP \cdot A_p + DRAG$
- $A_p = (OD - T) \cdot T \cdot \pi$
- $T = OD / SDR$
- $SDR = OD / T$
- F Force
- A_p Pipe area
- SDR Standard dimensional ratio
- T Thickness
- OD Outside diameter
- ID Inside diameter
- B Bead size
- π / Pi 3,14
- t time
- DRAG Drag Pressure 30 PSI
- IFP Interfacial Pressure = 75 PSI = (Min 60 PSI – Max 90 PSI)
- Temperature 204 – 232 °C | (400 – 450 °F)

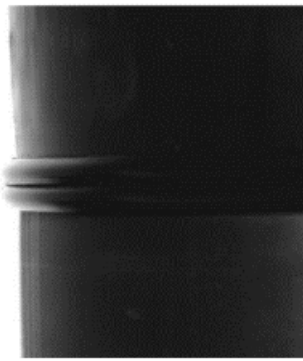
HDPE Thermoplastic pipe sizes IPS DIPS mm Chart Conversion

Nominal Pipe Size IPS (Known as Inches)	Real Size Outside Diameter (OD) (Inches)	Real Outside Diameter (OD) (mm) 1 Inch = 25,4 mm	Closer Metric Pipe size or (mm) (Not the same)	Real Size Outside Diameter (OD) (mm)
1/2" IPS	0,84"	21,34 mm	20 mm	20.3
3/4" IPS	1,05"	26,67 mm	25 mm	25.3
1" IPS	1,32"	33,40 mm	32 mm	32.3
1-1/4" IPS	1,66"	42,16 mm	40 mm	40.4
1-1/2" IPS	1,90"	48,26 mm	50 mm	50.5
2" IPS	2,38"	60,33 mm	63 mm	63.4
3" IPS	3,50"	88,90 mm	90 mm	90.6
4" IPS	4,50"	114,30 mm	110 mm	110.7
6" IPS	6,63"	168,28 mm	160 mm	161
8" IPS	8,63"	219,08 mm	200 mm	201.2
10" IPS	10,75"	273,05 mm	250 mm	249.7
12" IPS	12,75"	323,85 mm	315 mm	314.6
14" IPS	14,00"	355,60 mm	355 mm	354.2
16" IPS	16,00"	406,40 mm	400 mm	399.3
18" IPS	18,00"	457,20 mm	450 mm	449.9
20" IPS	20,00"	508,00 mm	500 mm	499.4
22" IPS	22,00"	558,80 mm	550 mm	563.4
24" IPS	24,00"	609,60 mm	600 mm	629.2
25" IPS	25,00"	635,00 mm	630 mm	633.8
28" IPS	28,00"	711,20 mm	700 mm	
30" IPS	30,00"	762,00 mm	750 mm	
32" IPS	32,00"	812,80 mm	800 mm	807.2
36" IPS	36,00"	914,40 mm	900 mm	908.1
42" IPS	42,00"	1066,80 mm	1000 mm	1009
48" IPS	48,00"	1219,20 mm	1200 mm	

Butt fusion visual appearance guideline

Reference: ASTM F 2620

ACCEPTABLE VISUAL APPEARANCE



Proper double roll-back bead.
Proper alignment.

UNACCEPTABLE VISUAL APPEARANCE



Incomplete face-off.



Improper alignment in fusion machine—mitered joint.



"high-low" pipe alignment.
Visually mitered joint.



Contamination in joint.

Improper

Preventative Maintenance

• STORE

To ensure optimum performance, the machine must be kept clean and well maintained. Store machine inside, in a dry cover area, out of the element of the weather.

• CLEAN AND DRY

Clean the machine body with a soap and water, wash as needed and keep it dry. Remove the heater and trimmer from the spray area before cleaning.

When cleaning the heating tool don't use an abrasive pad or steel wool. Use a non-synthetic cloth that won't damage or scratch surfaces.

• REMOVE DIRT AND LUBRICATE

Remove oily dirt buildup from guide rods and use WD-40 to lubricate it and wipe it. Do not leave the cleaning agent on the guide rods. Lubricate guide rod bushings with SAE 10W-40 motor oil through the oil holes on the movable jaw.

Occasionally add a drop of oil to pivot pins and shafts. Wash and clean bearings and threads in kerosene or solvent and keep them lubricated.

- **KEEP EVERYTHING NICE AND TIGHT**

Check all nuts, bolts, and snap rings to make certain they are secure and in place.

- **ADJUSTING TEMPERATURE**

Allow heater to stabilize at the new temperature (5 to 10 minutes) after adjusting.

Inspection

Items	Details	Satisfactor y	Needs Repai r	Comments
Trimmer	Inspect the trimmer blades for damage and sharpness			
	Check cord, plug and switch			
	Trimmer does not wobble when trapped between jaws			
Heater	Cord and plug are in good condition			
	Heater surface is clean and in good condition			
	Surface temperature checked with pyrometer			
Temperature c ontroller	Thermometer is in good working order			
	Check cord, plug and switch			
Basic frame	Clamp knob bearings lubricated and move freely			
	Lever handles are with unit			
	All nuts and bolts are tight			
	Guide rods are not damaged			

Make as many copies of this page as you need.

Warranty

- **LIMITED WARRANTY**

Hayes warrants all products distributed. All products have 12 months warranty against manufacturer's defects from the date of purchase directly from Hayes or Hayes authorized dealers. Furthermore, this warranty only covers factory defects.

- **RETURN OF GOODS**

Buyer must receive written authorization directly from Hayes or Hayes authorized dealer before any returns.

The goods must be in the same condition as received. The buyer has 15 days to request a return of goods after the date of the purchase. Buyer is responsible for return freight for any reason other than manufacturer's defects.

- **IMPROVEMENT**

Hayes reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold machines and/or the accessories.

- **PROPRIETARY RIGHTS**

All proprietary rights pertaining to the design, colors, and branding, are exclusively the property of Hayes.

- **DISCLAIMER OF LIABILITY**

Hayes accepts no responsibility of liability for fusion joints. Operation and maintenance of the product is the responsibility of operators. We recommend qualified joining procedures to be follow when using Hayes fusion equipment. Hayes makes no further warranty of any kind whatever, express or implied; and all implied warranties of merchantability and fitness for a particular purpose which exceed the obligation are hereby disclaimed by Hayes.

Remember your product information to activate your warranty.

- Model No: _____
- Serial No.: _____
- Inspector: _____
- Date of the purchase: _____
- Distributor: _____

HAYES Quality Certificate

Dear Customer,


Your machine has been fully tested and inspected for quality assurance by our technical department.

- COMBAT4PROX # _____
- COMBAT6PROX # _____
- COMBAT8PROX # _____




This welding machine meets the HAYES quality standards and is released for field use.

- Date:
- Signature:

www.hayesfusion.com

 <p>HAYES Manual Butt Fusion Machines Operator's Manual</p>	<p>HAYES COMBAT PROX Series Butt Fusion Machines [pdf] Instruction Manual COMBAT PROX Series Butt Fusion Machines, COMBAT PROX Series, Butt Fusion Machines, Fusion Machines, Machines</p>
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References

-  [HDPE SOCKET AND BUTT FUSION MACHINES | In Stock – World Class Plastic Pipe Welding Machines](#)
-  [HDPE SOCKET AND BUTT FUSION MACHINES | In Stock – World Class Plastic Pipe Welding Machines](#)
-  [P65warnings.ca.gov](#)
- [User Manual](#)