



Fusing X

FX160
FX200
FX250
FX315
FX355

User Manual

WELPING MACHINERY
HANGZHOU·CHINA



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WARNING!

Read this Operator's Manual carefully before using the tool. Failure to understand and follow the instructions of this manual may result in electrical shock, fire and/or serious personal injury.



1. What Is Butt Fusion?

Butt fusion is a welding process used to join thermoplastic pipes and fittings by heating the prepared ends and pressing them together under controlled conditions. When performed correctly, the fused joint becomes as strong as, or stronger than, the original pipe material and forms a continuous, leak-free pipeline system. This welding method is widely used for joining HDPE (High Density Polyethylene) pipes and fittings, as well as other thermoplastic materials such as PP. Butt fusion is especially suitable for pressure and non-pressure pipeline systems where long-term strength and reliability are required.

Principle of Butt Fusion

The butt fusion process consists of several basic steps:

1. Clamping and Alignment

The pipe or fitting ends are securely clamped in the machine to ensure correct alignment and stability during the welding process.

2. Facing

A milling cutter is used to trim and clean the pipe ends, creating smooth, parallel surfaces that ensure full contact during fusion.

3. Heating

The prepared pipe ends are pressed against a heating plate at a controlled temperature until the material reaches a molten state.

4. Fusion

After removing the heating plate, the molten pipe ends are brought together under controlled pressure, allowing the materials to fuse into a single, homogeneous joint.

5. Cooling

The fused joint is held under pressure for a specified cooling period to allow the material to solidify and achieve full joint strength.

Typical Applications

Butt fusion welding is commonly used in the following pipeline systems:

- Water supply and drainage pipelines
- Gas distribution pipelines
- Industrial process piping
- Mining and slurry pipelines
- Agricultural irrigation systems

Relation to the FX315 Welding Machine

The Fx315 butt fusion welding machine is designed to provide accurate alignment, stable heating, and controlled fusion pressure to ensure consistent and reliable welding results. When operated in accordance with this manual, the machine enables users to produce high-quality butt fusion joints that meet the requirements of modern pipeline construction.

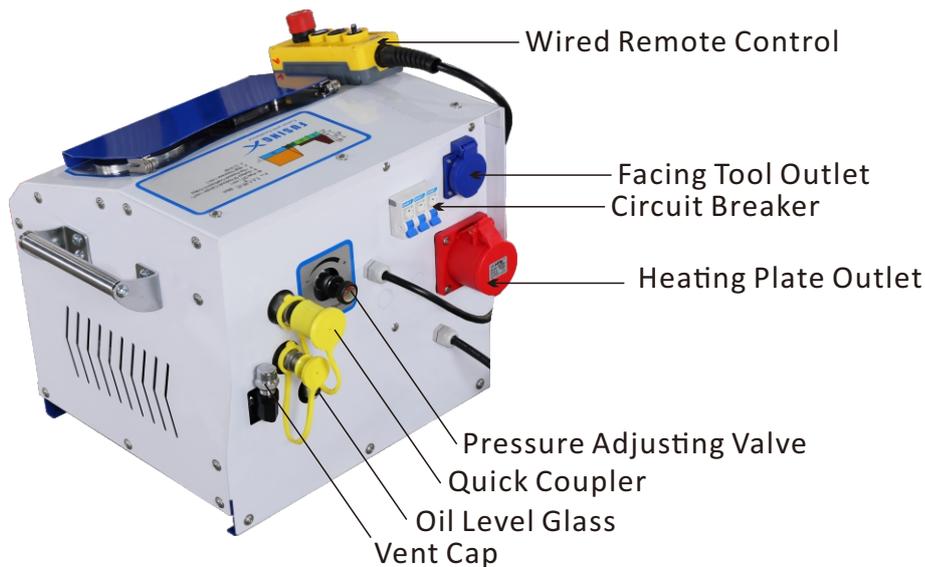
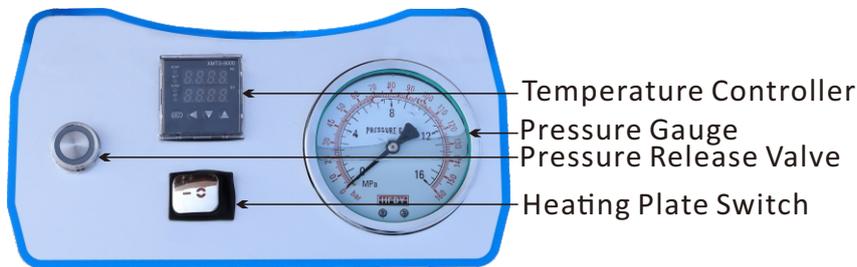


2. Machine Overview

The hydraulic butt fusion welding machine is designed for joining thermoplastic pipes and fittings such as HDPE and PP. The machine uses a hydraulic system to generate controlled and stable fusion pressure, ensuring accurate alignment and consistent welding quality. The machine is suitable for workshop and on-site pipeline construction, offering reliable performance, ease of operation, and repeatable welding results.

Main Components

1. Machine Frame and Clamping Unit
2. Hydraulic Station



3. Facing Tool (Milling Cutter)
4. Heating Plate
5. Carrying and storage rack for facing tool and heating plate

Machine Functions Overview

During operation, the machine performs the following functions in sequence:

- Clamping and aligning the pipes
- Facing the pipe ends
- Heating the pipe ends using the heating plate
- Applying fusion pressure using the hydraulic system
- Holding pressure during cooling

Each function is designed to work together to ensure a strong, homogeneous butt fusion joint.

Nameplate

The machine is equipped with a nameplate that provides essential information, including:

- Model
- Specification
- Voltage
- Overall power
- Cylinder area
- Hydraulic oil
- Serial number
- Date



Operators should refer to this plate when requesting service or spare parts.

Intense Use

This hydraulic butt fusion welding machine is intended exclusively for butt fusion welding of thermoplastic pipes and fittings within the specified size and material range.

Any use outside the intended purpose, or operation not in accordance with this manual, may result in unsafe conditions or damage to the equipment.



3. Safety Instructions

All operators must read and understand these safety instructions before using the equipment. Failure to follow these instructions may result in personal injury, equipment damage, or poor welding quality.

General Safety Information

- This machine shall only be operated by trained and authorized persons.
- The operator must be familiar with butt fusion welding principles and the functions of the machine.
- Always follow the procedures described in this manual.
- Do not modify the machine or its components without authorization from the manufacturer.
- Keep this manual available at the work site for reference.

Intended Use and Misuse

The hydraulic butt fusion welding machine is designed exclusively for butt fusion welding of thermoplastic pipes and fittings such as HDPE and PP within the specified size range. The following uses are **strictly prohibited**:

- Welding materials other than approved thermoplastics
- Operating the machine beyond its rated pipe size or pressure limits
- Using the machine as a lifting, pressing, or clamping device for other purposes
- Operating the machine with damaged or missing safety components

Personal Protective Equipment

During operation, the following personal protective equipment is recommended:

-  Safety gloves resistant to heat
-  Safety glasses or face shield
-  Protective footwear
-  Safety helmet
-  Close-fitting work clothing

Loose clothing, jewelry, or long hair that may become caught in moving parts must be avoided.

Hazards Related to Hydraulic System

The machine operates with **high hydraulic pressure**, which can cause serious injury if handled improperly.

- Never exceed the specified hydraulic pressure.
- Inspect hydraulic hoses and connections regularly for leaks or damage.
- Do not disconnect hydraulic lines while the system is pressurized.
- Release hydraulic pressure before performing maintenance or adjustments.
- Hydraulic oil leaks under pressure can penetrate skin and must be treated as a medical emergency.

Hazards Related to Heating Plate

The heating plate operates at **high temperatures** and can cause severe burns.

- Do not touch the heating plate or heated pipe ends during or immediately after operation.
- Always use designated handles when handling the heating plate.
- Place the heating plate only on its support or stand when not in use.
- Allow sufficient cooling time before storage or maintenance.

Mechanical Hazards

Moving parts of the machine may cause crushing or pinching injuries.

- Keep hands and body parts away from clamps and moving carriages during operation.
- Never place hands between pipe ends during fusion.
- Ensure pipes are securely clamped before facing or heating.
- Do not bypass or disable mechanical safety features.

Electrical Safety

- Ensure the power supply matches the machine rating.
- Use properly grounded electrical connections.
- Do not operate the machine with damaged cables or plugs.
- Disconnect power before servicing electrical components.
- Protect electrical components from moisture and rain.

Work Area Safety

- Keep the work area clean and free of obstacles.
- Ensure adequate lighting and stable ground conditions.
- Prevent unauthorized persons from entering the work area during operation.
- Secure pipes properly to prevent rolling or sudden movement.

Maintenance and Service Safety

- Maintenance and repair work shall only be performed by qualified personnel.
- Always shut down the machine, disconnect the power supply, and release hydraulic pressure before maintenance.
- Use only original or approved spare parts.
- After maintenance, ensure all safety devices are correctly reinstalled before operation.

Emergency Situations

- In case of abnormal noise, vibration, oil leakage, or malfunction, stop the machine immediately.
- Disconnect the power supply and release hydraulic pressure.
- Do not resume operation until the cause of the problem has been identified and resolved.
- In case of personal injury, seek medical attention immediately.

Operator Responsibility

- Following all safety instructions in this manual.
- Ensuring the machine is in safe operating condition
- Using correct welding procedures
- Preventing unsafe operation by others



4. Preparation Before Welding

Proper preparation before welding is essential to ensure safety, welding quality, and reliable joint performance. This chapter describes the necessary checks and preparations that must be completed before starting the butt fusion welding process.

Work Site Preparation

Before setting up the welding machine, ensure that the work site meets the following requirements:

- The ground is stable, level, and capable of supporting the machine and pipes
- The working area is clean and free from obstacles
- Adequate lighting is available
- The area is protected from rain, excessive dust, and strong wind

- Unauthorized personnel are kept away from the work area
- For outdoor welding, additional protection such as a welding tent is recommended to minimize environmental influence.

Pipe and Fitting Inspection

Before welding, all pipes and fittings must be carefully inspected:

- Confirm that the pipe material and size are suitable for butt fusion welding
- Ensure that pipes and fittings are clean, dry, and free from oil, grease, dust, and damage
- Check that pipe ends are round and not excessively oval
- Ensure that pipes and fittings are from compatible materials

Damaged, contaminated, or incompatible pipes and fittings must not be welded.

Machine Setup

Positioning the Machine

- Place the machine on stable ground
- Ensure the machine frame is level
- Lock the machine in position to prevent movement during operation

Correct positioning ensures proper alignment and stable welding pressure.

Installing Clamps and Inserts

- Select the appropriate clamps or reducing inserts according to the pipe diameter
- Install and secure all clamps properly
- Ensure all clamps are clean and free of debris

Correct clamp installation is essential for maintaining pipe alignment and joint concentricity.

Hydraulic System Check

Before operation, perform the following checks on the hydraulic system:

- Check hydraulic oil level and conditions
- Inspect hydraulic hoses and fittings for leaks or damage
- Ensure all hydraulic connections are secure
- Verify that the pressure gauge is functioning properly

Do not operate the machine if hydraulic leaks or abnormal pressure behavior are detected.

Electrical System Check

- Verify that the power supply matches the machine rating
- Ensure the power cable and plugs are intact
- Confirm proper grounding of the machine
- Check the operation of switches and controls

Electrical faults must be corrected before welding begins.

Heating Plate Preparation

Inspect the heating plate for damage

Ensure the non-stick coating is clean and undamaged

Clean the heating plate surface using a soft, lint-free cloth

- Set the heating plate to the required temperature and allow sufficient preheating time
Do not use sharp tools or abrasive materials to clean the heating plate.

Facing Tool Preparation

- Check that the facing tool blades are sharp and properly installed
 - Ensure the facing tool rotates smoothly
 - Verify correct electrical connection
 - Remove any debris from previous operations
- A properly functioning facing tool is critical for achieving flat and parallel pipe ends.

Environmental Conditions

Environmental conditions can affect welding quality. Before welding, consider the following:

- Ambient temperature
- Wind speed
- Rain or moisture
- Direct sunlight

If environmental conditions are unfavorable, take appropriate protective measures or postpone welding.

Pre-Welding Checklist

Before starting the welding process, confirm that:

- The machine is correctly positioned and secured
- Pipes and fittings are properly clamped and aligned
- Hydraulic and electrical systems are functioning normally
- Heating plate has reached the required temperature
- Facing tool is ready for operation
- All safety instructions have been reviewed

Only after completing all preparation steps may the welding process begin.

Transition to Welding Operation

Once all preparations and checks are completed, proceed to the welding process as described in the next Chapter – Operating Procedure.



5. Operating Procedure

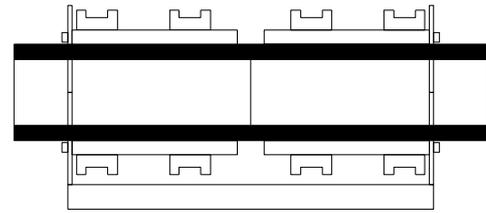
This chapter describes the standard operating procedure for butt fusion welding using the hydraulic welding machine. All steps must be performed in the specified order to ensure welding quality and operational safety.

General Operating Notes

- Only trained operators are permitted to perform welding operations.
- Ensure all preparations described in the Chapter of **Preparation Before Welding** have been completed.
- Welding parameters must be selected according to pipe size, material, and applicable welding guidelines.
- Do not rush any step of the welding process.

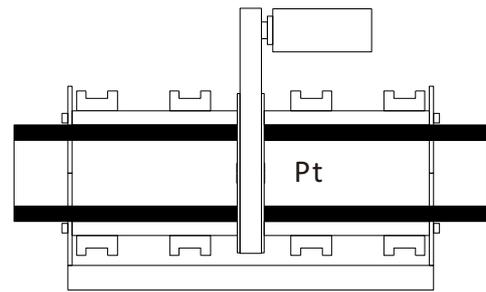
Clamping and Alignment

- Open the clamps and place the pipes or fittings into the machine.
 - Secure the pipes firmly using the appropriate clamps or reducing inserts.
 - Adjust the pipe position to ensure proper alignment and concentricity.
 - Close the clamps and check that the pipes are held securely without deformation.
- Correct alignment is critical for achieving a strong and uniform fusion joint.



Facing (Trimming)

- Install the facing tool between the pipe ends.
- Activate the hydraulic system and bring the pipe ends into contact with the facing tool.
- Start the facing tool and apply sufficient pressure to produce continuous shavings from both ends.
- Continue facing until both pipe ends are flat, smooth, and parallel.
- Retract the pipes, stop the facing tool, and remove it carefully.

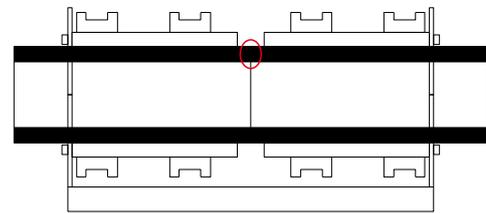


Do not touch the faced pipe ends after trimming. Any contamination may compromise weld quality.

Checking Alignment After Facing

- Bring the faced pipe ends together slowly.
- Visually inspect the alignment and gap between the pipe ends.
- If misalignment or uneven contact is observed, repeat the facing process.

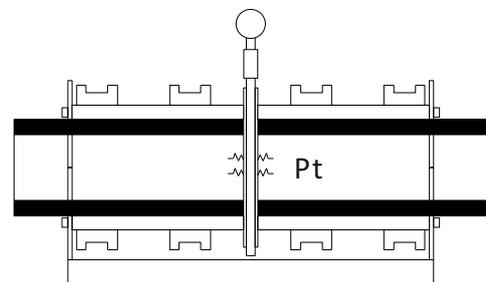
Only proceed to heating when correct alignment is confirmed.



Heating

- Insert the preheated heating plate between the pipe ends.
- Bring the pipe ends into contact with the heating plate under the specified heating pressure.
- Maintain contact until a uniform melt bead forms around the circumference of both pipe ends.
- Monitor the heating time according to the selected welding parameters.

Do not exceed the recommended heating time or temperature.



Changeover (Heating Plate Removal)

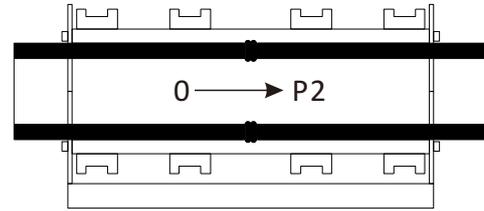
- Retract the pipe ends from the heating plate.
- Remove the heating plate quickly and safely using the designated handles.
- Immediately move the pipe ends toward each other.

The changeover time must be minimized to prevent excessive cooling of the molten surfaces.

Fusion (Joining)

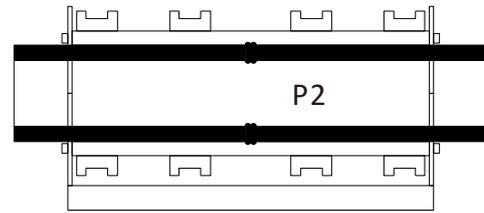
- Bring the molten pipe ends together smoothly.
- Apply the specified fusion pressure using the hydraulic system.
- Maintain steady pressure until a uniform fusion bead forms around the joint.

Avoid sudden pressure changes or impact during fusion.



Cooling

- Maintain fusion pressure during the initial cooling phase.
 - Do not release pressure or disturb the joint during cooling.
 - Observe the required cooling time based on pipe size and material.
- Premature movement or pressure release may result in weak joints.



Releasing and Removing the Pipe

- After the cooling time has elapsed, gradually release hydraulic pressure.
- Open the clamps carefully.
- Remove the welded pipe from the machine.

Handle the welded joint carefully to avoid mechanical stress.

Visual Inspection of the Weld

After welding, perform a visual inspection of the joint:

- Fusion bead is uniform and symmetrical
 - No cracks, voids, or contamination are visible
 - Bead size is consistent around the circumference
- If defects are observed, the joint should be rejected and rewelded.

Shutdown After Welding

- Turn off the hydraulic power unit.
 - Switch off electrical components.
 - Allow the heating plate to cool before storage.
- Clean the machine and remove debris from clamps and tools.
Proper shutdown and cleaning help extend machine service life.

Operating Responsibility

The operator is responsible for:

- Following the correct operating sequence
- Selecting appropriate welding parameters
- Ensuring joint quality
- Maintaining safe working conditions



6. Machine Specifications

FX160	
Power Specifications	
Voltage	220V
Frequency	50/60Hz
Overall Power	3.45kW
Heating Plate	1.5kW
Facing Tool	1.4kW
Hydraulic Station	0.55kW
Hydraulic Specifications	
Max. Pressure	8Mpa
Cylinder Area	15.32cm ²
Hydraulic Oil	L-HM46
Ambient temperature	-5°C ~ 45°C
Welding Range	40-160mm
Weldable Material	PE/PP

FX200	
Power Specifications	
Voltage	220V
Frequency	50/60Hz
Overall Power	3.75kW
Heating Plate	1.8kW
Facing Tool	1.4kW
Hydraulic Station	0.55kW
Hydraulic Specifications	
Max. Pressure	8Mpa
Cylinder Area	15.32cm ²
Hydraulic Oil	L-HM46
Ambient temperature	-5°C ~ 45°C
Welding Range	63-200mm
Weldable Material	PE/PP

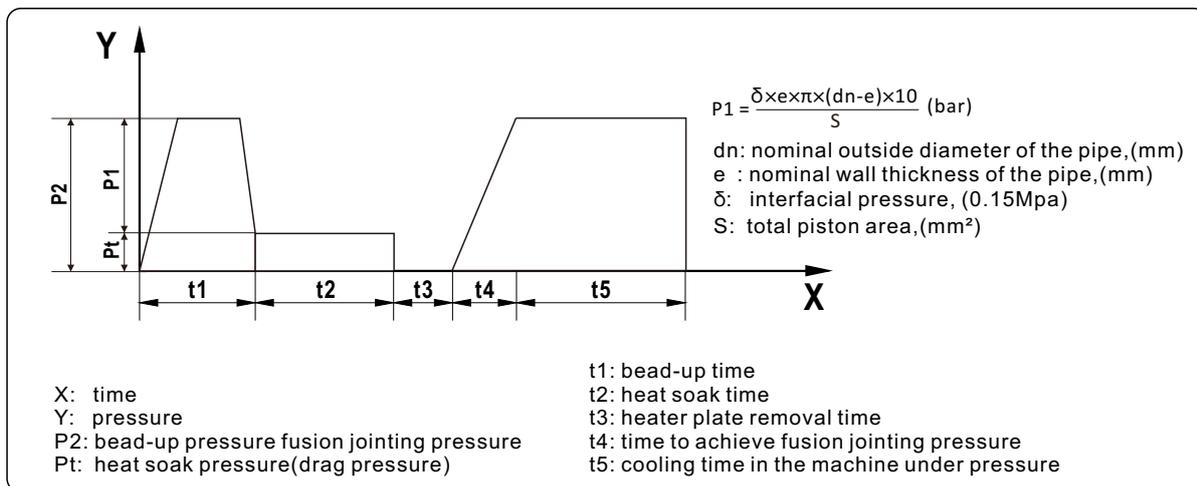
FX250	
Power Specifications	
Voltage	220V
Frequency	50/60Hz
Overall Power	4.85kW
Heating Plate	2.3kW
Facing Tool	2.0kW
Hydraulic Station	0.55kW
Hydraulic Specifications	
Max. Pressure	8Mpa
Cylinder Area	11.0cm ²
Hydraulic Oil	L-HM46
Ambient temperature	-5°C ~ 45°C
Welding Range	63-250mm
Weldable Material	PE/PP

FX315	
Power Specifications	
Voltage	220V
Frequency	50/60Hz
Overall Power	5.65kW
Heating Plate	3.1kW
Facing Tool	2.0kW
Hydraulic Station	0.55kW
Hydraulic Specifications	
Max. Pressure	8Mpa
Cylinder Area	20.02cm ²
Hydraulic Oil	L-HM46
Ambient temperature	-5°C ~ 45°C
Welding Range	90-315mm
Weldable Material	PE/PP

FX355	
Power Specifications	
Voltage	220V
Frequency	50/60Hz
Overall Power	6.15kW
Heating Plate	3.6kW
Facing Tool	2.0kW
Hydraulic Station	0.55kW
Hydraulic Specifications	
Max. Pressure	8Mpa
Cylinder Area	20.02cm ²
Hydraulic Oil	L-HM46
Ambient temperature	-5°C ~ 45°C
Welding Range	90-355mm
Weldable Material	PE/PP



7. Welding Parameters & Reference Values



FX160

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
40	6.3	26	1.54	225±10	0.2	0.7	21	5	4	5
40	8	21	1.9	225±10	0.2	0.7	26	5	4	5
40	9	17.6	2.27	225±10	0.3	0.7	31	5	4	5
40	10	17	2.35	225±10	0.3	0.7	32	5	4	5
40	12.5	13.6	2.94	225±10	0.3	0.8	40	5	4	6
40	16	11	3.64	225±10	0.4	0.9	49	5	4	7

FX160

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
40	20	9	4.44	225±10	0.5	0.9	60	5	4	7
40	25	7.4	5.41	225±10	0.6	1	73	6	4	8
50	6.3	26	1.92	225±10	0.3	0.7	26	5	5	5
50	8	21	2.38	225±10	0.3	0.7	32	5	5	5
50	9	17.6	2.84	225±10	0.4	0.8	38	5	5	6
50	10	17	2.94	225±10	0.4	0.8	40	5	5	6
50	12.5	13.6	3.68	225±10	0.5	0.9	50	5	5	7
50	16	11	4.55	225±10	0.6	1	61	6	5	8
50	20	9	5.56	225±10	0.8	1.1	75	6	5	9
50	25	7.4	6.76	225±10	0.9	1.2	91	6	5	10
63	6.3	26	2.42	225±10	0.5	0.7	33	5	5	5
63	8	21	3	225±10	0.6	0.8	41	5	5	6
63	9	17.6	3.58	225±10	0.7	0.9	48	5	5	7
63	10	17	3.71	225±10	0.7	0.9	50	5	5	7
63	12.5	13.6	4.63	225±10	0.8	1	63	6	5	8
63	16	11	5.73	225±10	1	1.1	77	6	5	9
63	20	9	7	225±10	1.2	1.2	95	6	5	10
63	25	7.4	8.51	225±10	1.4	1.4	115	8	5	12
75	6.3	26	2.88	225±10	0.6	0.8	39	5	5	6
75	8	21	3.57	225±10	0.8	0.9	48	5	5	7
75	9	17.6	4.26	225±10	0.9	0.9	58	5	5	7
75	10	17	4.41	225±10	1	0.9	60	5	5	7
75	12.5	13.6	5.51	225±10	1.2	1.1	74	6	5	9
75	16	11	6.82	225±10	1.4	1.2	92	6	5	10
75	20	9	8.33	225±10	1.7	1.3	112	8	5	11
75	25	7.4	10.14	225±10	2	1.5	137	8	5	13
90	6.3	26	3.46	225±10	0.9	0.8	47	5	6	6
90	8	21	4.29	225±10	1.1	0.9	58	5	6	7
90	9	17.6	5.11	225±10	1.3	1	69	6	6	8
90	10	17	5.29	225±10	1.4	1	71	6	6	8
90	12.5	13.6	6.62	225±10	1.7	1.2	89	6	6	10
90	16	11	8.18	225±10	2.1	1.3	110	8	6	11
90	20	9	10	225±10	2.5	1.5	135	8	6	13
90	25	7.4	12.16	225±10	2.9	1.7	164	10	6	15
110	6.3	26	4.23	225±10	1.4	0.9	57	5	6	7
110	8	21	5.24	225±10	1.7	1	71	6	6	8
110	9	17.6	6.25	225±10	2	1.1	84	6	6	9
110	10	17	6.47	225±10	2.1	1.1	87	6	6	9
110	12.5	13.6	8.09	225±10	2.5	1.3	109	8	6	11
110	16	11	10	225±10	3.1	1.5	135	8	6	13
110	20	9	12.22	225±10	3.7	1.7	165	10	6	15

FX160

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
110	25	7.4	14.86	225±10	4.3	2	201	10	6	18
125	6.3	26	4.81	225±10	1.8	1	65	6	7	8
125	8	21	5.95	225±10	2.2	1.1	80	6	7	9
125	9	17.6	7.1	225±10	2.6	1.2	96	8	7	10
125	10	17	7.35	225±10	2.7	1.2	99	8	7	10
125	12.5	13.6	9.19	225±10	3.3	1.4	124	8	7	12
125	16	11	11.36	225±10	4	1.6	153	8	7	14
125	20	9	13.89	225±10	4.7	1.9	188	10	7	17
125	25	7.4	16.89	225±10	5.6	2.2	228	10	7	20
140	6.3	26	5.38	225±10	2.2	1	73	6	7	8
140	8	21	6.67	225±10	2.7	1.2	90	6	7	10
140	9	17.6	7.95	225±10	3.2	1.3	107	8	7	11
140	10	17	8.24	225±10	3.3	1.3	111	8	7	11
140	12.5	13.6	10.29	225±10	4.1	1.5	139	8	7	13
140	16	11	12.73	225±10	5	1.8	172	10	7	16
140	20	9	15.56	225±10	6	2.1	210	10	7	19
140	25	7.4	18.92	225±10	7	2.4	255	10	7	16
160	6.3	26	6.15	225±10	2.9	1.1	83	6	8	9
160	8	21	7.62	225±10	3.6	1.3	103	8	8	11
160	9	17.6	9.09	225±10	4.2	1.4	123	8	8	12
160	10	17	9.41	225±10	4.4	1.4	127	8	8	12
160	12.5	13.6	11.76	225±10	5.4	1.7	159	8	8	15
160	16	11	14.55	225±10	6.5	2	196	10	8	18
160	20	9	17.78	225±10	7.8	2.3	240	10	8	21
160	25	7.4	21.62	225±10	9.2	2.7	292	12	8	17

FX200

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
63	6.3	26	2.42	225±10	0.5	0.7	33	5	5	5
63	8	21	3	225±10	0.6	0.8	41	5	5	6
63	9	17.6	3.58	225±10	0.7	0.9	48	5	5	7
63	10	17	3.71	225±10	0.7	0.9	50	5	5	7
63	12.5	13.6	4.63	225±10	0.8	1	63	6	5	8
63	16	11	5.73	225±10	1	1.1	77	6	5	9
63	20	9	7	225±10	1.2	1.2	95	6	5	10
63	25	7.4	8.51	225±10	1.4	1.4	115	8	5	12
75	6.3	26	2.88	225±10	0.6	0.8	39	5	5	6
75	8	21	3.57	225±10	0.8	0.9	48	5	5	7
75	9	17.6	4.26	225±10	0.9	0.9	58	5	5	7
75	10	17	4.41	225±10	1	0.9	60	5	5	7

FX200

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
75	12.5	13.6	5.51	225±10	1.2	1.1	74	6	5	9
75	16	11	6.82	225±10	1.4	1.2	92	6	5	10
75	20	9	8.33	225±10	1.7	1.3	112	8	5	11
75	25	7.4	10.14	225±10	2	1.5	137	8	5	13
90	6.3	26	3.46	225±10	0.9	0.8	47	5	6	6
90	8	21	4.29	225±10	1.1	0.9	58	5	6	7
90	9	17.6	5.11	225±10	1.4	1	69	6	6	8
90	10	17	5.29	225±10	1.4	1	71	6	6	8
90	12.5	13.6	6.62	225±10	1.7	1.2	89	6	6	10
90	16	11	8.18	225±10	2.1	1.3	110	8	6	11
90	20	9	10	225±10	2.5	1.5	135	8	6	13
90	25	7.4	12.16	225±10	2.9	1.7	164	10	6	15
110	6.3	26	4.23	225±10	1.4	0.9	57	5	6	7
110	8	21	5.24	225±10	1.7	1	71	6	6	8
110	9	17.6	6.25	225±10	2	1.1	84	6	6	9
110	10	17	6.47	225±10	2.1	1.1	87	6	6	9
110	12.5	13.6	8.09	225±10	2.6	1.3	109	8	6	11
110	16	11	10	225±10	3.1	1.5	135	8	6	13
110	20	9	12.22	225±10	3.7	1.7	165	10	6	15
110	25	7.4	14.86	225±10	4.4	2	201	10	6	18
125	6.3	26	4.81	225±10	1.8	1	65	6	7	8
125	8	21	5.95	225±10	2.2	1.1	80	6	7	9
125	9	17.6	7.1	225±10	2.6	1.2	96	8	7	10
125	10	17	7.35	225±10	2.7	1.2	99	8	7	10
125	12.5	13.6	9.19	225±10	3.3	1.4	124	8	7	12
125	16	11	11.36	225±10	4	1.6	153	8	7	14
125	20	9	13.89	225±10	4.8	1.9	188	10	7	17
125	25	7.4	16.89	225±10	5.7	2.2	228	10	7	20
140	6.3	26	5.38	225±10	2.3	1	73	6	7	8
140	8	21	6.67	225±10	2.8	1.2	90	6	7	10
140	9	17.6	7.95	225±10	3.3	1.3	107	8	7	11
140	10	17	8.24	225±10	3.4	1.3	111	8	7	11
140	12.5	13.6	10.29	225±10	4.2	1.5	139	8	7	13
140	16	11	12.73	225±10	5	1.8	172	10	7	16
140	20	9	15.56	225±10	6	2.1	210	10	7	19
140	25	7.4	18.92	225±10	7.1	2.4	255	10	7	16

FX200

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
160	6.3	26	6.15	225±10	2.9	1.1	83	6	8	9
160	8	21	7.62	225±10	3.6	1.3	103	8	8	11
160	9	17.6	9.09	225±10	4.3	1.4	123	8	8	12
160	10	17	9.41	225±10	4.4	1.4	127	8	8	12
160	12.5	13.6	11.76	225±10	5.4	1.7	159	8	8	15
160	16	11	14.55	225±10	6.6	2	196	10	8	18
160	20	9	17.78	225±10	7.9	2.3	240	10	8	21
160	25	7.4	21.62	225±10	9.3	2.7	292	12	8	17
180	6.3	26	6.92	225±10	3.7	1.2	93	6	8	10
180	8	21	8.57	225±10	4.6	1.4	116	8	8	12
180	9	17.6	10.23	225±10	5.4	1.5	138	8	8	13
180	10	17	10.59	225±10	5.6	1.6	143	8	8	14
180	12.5	13.6	13.24	225±10	6.9	1.8	179	10	8	16
180	16	11	16.36	225±10	8.3	2.1	221	10	8	19
180	20	9	20	225±10	10	2.5	270	12	8	17
180	25	7.4	24.32	225±10	11.8	2.9	328	12	8	17
200	6.3	26	7.69	225±10	4.6	1.3	104	8	9	11
200	8	21	9.52	225±10	5.6	1.5	129	8	9	13
200	9	17.6	11.36	225±10	6.7	1.6	153	8	9	14
200	10	17	11.76	225±10	6.9	1.7	159	8	9	15
200	12.5	13.6	14.71	225±10	8.5	2	199	10	9	18
200	16	11	18.18	225±10	10.3	2.3	245	10	9	16
200	20	9	22.22	225±10	12.3	2.7	300	12	9	17
200	25	7.4	27.03	225±10	14.6	3.2	365	16	9	18

FX250

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
63	6.3	26	2.42	225±10	0.6	0.7	33	5	5	5
63	8	21	3	225±10	0.8	0.8	41	5	5	6
63	9	17.6	3.58	225±10	0.9	0.9	48	5	5	7
63	10	17	3.71	225±10	0.9	0.9	50	5	5	7
63	12.5	13.6	4.63	225±10	1.1	1	63	6	5	8
63	16	11	5.73	225±10	1.4	1.1	77	6	5	9
63	20	9	7	225±10	1.7	1.2	95	6	5	10
63	25	7.4	8.51	225±10	2	1.4	115	8	5	12

FX250

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
75	6.3	26	2.88	225±10	0.9	0.8	39	5	5	6
75	8	21	3.57	225±10	1.1	0.9	48	5	5	7
75	9	17.6	4.26	225±10	1.3	0.9	58	5	5	7
75	10	17	4.41	225±10	1.3	0.9	60	5	5	7
75	12.5	13.6	5.51	225±10	1.6	1.1	74	6	5	9
75	16	11	6.82	225±10	2	1.2	92	6	5	10
75	20	9	8.33	225±10	2.3	1.3	112	8	5	11
75	25	7.4	10.14	225±10	2.8	1.5	137	8	5	13
90	6.3	26	3.46	225±10	1.3	0.8	47	5	6	6
90	8	21	4.29	225±10	1.6	0.9	58	5	6	7
90	9	17.6	5.11	225±10	1.8	1	69	6	6	8
90	10	17	5.29	225±10	1.9	1	71	6	6	8
90	12.5	13.6	6.62	225±10	2.3	1.2	89	6	6	10
90	16	11	8.18	225±10	2.8	1.3	110	8	6	11
90	20	9	10	225±10	3.4	1.5	135	8	6	13
90	25	7.4	12.16	225±10	4	1.7	164	10	6	15
110	6.3	26	4.23	225±10	1.9	0.9	57	5	6	7
110	8	21	5.24	225±10	2.3	1	71	6	6	8
110	9	17.6	6.25	225±10	2.7	1.1	84	6	6	9
110	10	17	6.47	225±10	2.8	1.1	87	6	6	9
110	12.5	13.6	8.09	225±10	3.5	1.3	109	8	6	11
110	16	11	10	225±10	4.2	1.5	135	8	6	13
110	20	9	12.22	225±10	5	1.7	165	10	6	15
110	25	7.4	14.86	225±10	6	2	201	10	6	18
125	6.3	26	4.81	225±10	2.4	1	65	6	7	8
125	8	21	5.95	225±10	3	1.1	80	6	7	9
125	9	17.6	7.1	225±10	3.5	1.2	96	8	7	10
125	10	17	7.35	225±10	3.6	1.2	99	8	7	10
125	12.5	13.6	9.19	225±10	4.5	1.4	124	8	7	12
125	16	11	11.36	225±10	5.4	1.6	153	8	7	14
125	20	9	13.89	225±10	6.5	1.9	188	10	7	17
125	25	7.4	16.89	225±10	7.7	2.2	228	10	7	20
140	6.3	26	5.38	225±10	3.1	1	73	6	7	8
140	8	21	6.67	225±10	3.8	1.2	90	6	7	10
140	9	17.6	7.95	225±10	4.4	1.3	107	8	7	11
140	10	17	8.24	225±10	4.6	1.3	111	8	7	11

FX250

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
140	12.5	13.6	10.29	225±10	5.6	1.5	139	8	7	13
140	16	11	12.73	225±10	6.8	1.8	172	10	7	16
140	20	9	15.56	225±10	8.2	2.1	210	10	7	19
140	25	7.4	18.92	225±10	9.7	2.4	255	10	7	16
160	6.3	26	6.15	225±10	4	1.1	83	6	8	9
160	8	21	7.62	225±10	4.9	1.3	103	8	8	11
160	9	17.6	9.09	225±10	5.8	1.4	123	8	8	12
160	10	17	9.41	225±10	6	1.4	127	8	8	12
160	12.5	13.6	11.76	225±10	7.4	1.7	159	8	8	15
160	16	11	14.55	225±10	8.9	2	196	10	8	18
160	20	9	17.78	225±10	10.7	2.3	240	10	8	21
160	25	7.4	21.62	225±10	12.6	2.7	292	12	8	17
180	6.3	26	6.92	225±10	5.1	1.2	93	6	8	10
180	8	21	8.57	225±10	6.2	1.4	116	8	8	12
180	9	17.6	10.23	225±10	7.3	1.5	138	8	8	13
180	10	17	10.59	225±10	7.6	1.6	143	8	8	14
180	12.5	13.6	13.24	225±10	9.3	1.8	179	10	8	16
180	16	11	16.36	225±10	11.3	2.1	221	10	8	19
180	20	9	20	225±10	13.5	2.5	270	12	8	17
180	25	7.4	24.32	225±10	16	2.9	328	12	8	17
200	6.3	26	7.69	225±10	6.2	1.3	104	8	9	11
200	8	21	9.52	225±10	7.7	1.5	129	8	9	13
200	9	17.6	11.36	225±10	9	1.6	153	8	9	14
200	10	17	11.76	225±10	9.3	1.7	159	8	9	15
200	12.5	13.6	14.71	225±10	11.5	2	199	10	9	18
200	16	11	18.18	225±10	14	2.3	245	10	9	16
200	20	9	22.22	225±10	16.7	2.7	300	12	9	17
200	25	7.4	27.03	225±10	19.7	3.2	365	16	9	18
225	6.3	26	8.65	225±10	7.9	1.4	117	8	10	12
225	8	21	10.71	225±10	9.7	1.6	145	8	10	14
225	9	17.6	12.78	225±10	11.4	1.8	173	10	10	16
225	10	17	13.24	225±10	11.8	1.8	179	10	10	16
225	12.5	13.6	16.54	225±10	14.6	2.2	223	10	10	20
225	16	11	20.45	225±10	17.7	2.5	276	12	10	17
225	20	9	25	225±10	21.1	3	338	12	10	18
225	25	7.4	30.41	225±10	25	3.5	411	16	10	20

FX250

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
250	6.3	26	9.62	225±10	9.8	1.5	130	8	11	13
250	8	21	11.9	225±10	12	1.7	161	8	11	15
250	9	17.6	14.2	225±10	14.1	1.9	192	10	11	17
250	10	17	14.71	225±10	14.6	2	199	10	11	18
250	12.5	13.6	18.38	225±10	18	2.3	248	10	11	16
250	16	11	22.73	225±10	21.8	2.8	307	12	11	17
250	20	9	27.78	225±10	26.1	3.3	375	16	11	19
250	25	7.4	33.78	225±10	30.8	3.9	456	16	11	21

FX315

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
90	6.3	26	3.46	225±10	0.7	0.8	47	5	6	6
90	8	21	4.29	225±10	0.9	0.9	58	5	6	7
90	9	17.6	5.11	225±10	1	1	69	6	6	8
90	10	17	5.29	225±10	1.1	1	71	6	6	8
90	12.5	13.6	6.62	225±10	1.3	1.2	89	6	6	10
90	16	11	8.18	225±10	1.6	1.3	110	8	6	11
90	20	9	10	225±10	1.9	1.5	135	8	6	13
90	25	7.4	12.16	225±10	2.2	1.7	164	10	6	15
110	6.3	26	4.23	225±10	1.1	0.9	57	5	6	7
110	8	21	5.24	225±10	1.3	1	71	6	6	8
110	9	17.6	6.25	225±10	1.5	1.1	84	6	6	9
110	10	17	6.47	225±10	1.6	1.1	87	6	6	9
110	12.5	13.6	8.09	225±10	1.9	1.3	109	8	6	11
110	16	11	10	225±10	2.4	1.5	135	8	6	13
110	20	9	12.22	225±10	2.8	1.7	165	10	6	15
110	25	7.4	14.86	225±10	3.3	2	201	10	6	18
125	6.3	26	4.81	225±10	1.4	1	65	6	7	8
125	8	21	5.95	225±10	1.7	1.1	80	6	7	9
125	9	17.6	7.1	225±10	2	1.2	96	8	7	10
125	10	17	7.35	225±10	2	1.2	99	8	7	10
125	12.5	13.6	9.19	225±10	2.5	1.4	124	8	7	12
125	16	11	11.36	225±10	3	1.6	153	8	7	14
125	20	9	13.89	225±10	3.6	1.9	188	10	7	17
125	25	7.4	16.89	225±10	4.3	2.2	228	10	7	20

FX315

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
140	6.3	26	5.38	225±10	1.7	1	73	6	7	8
140	8	21	6.67	225±10	2.1	1.2	90	6	7	10
140	9	17.6	7.95	225±10	2.5	1.3	107	8	7	11
140	10	17	8.24	225±10	2.6	1.3	111	8	7	11
140	12.5	13.6	10.29	225±10	3.1	1.5	139	8	7	13
140	16	11	12.73	225±10	3.8	1.8	172	10	7	16
140	20	9	15.56	225±10	4.6	2.1	210	10	7	19
140	25	7.4	18.92	225±10	5.4	2.4	255	10	7	16
160	6.3	26	6.15	225±10	2.2	1.1	83	6	8	9
160	8	21	7.62	225±10	2.7	1.3	103	8	8	11
160	9	17.6	9.09	225±10	3.2	1.4	123	8	8	12
160	10	17	9.41	225±10	3.3	1.4	127	8	8	12
160	12.5	13.6	11.76	225±10	4.1	1.7	159	8	8	15
160	16	11	14.55	225±10	5	2	196	10	8	18
160	20	9	17.78	225±10	5.9	2.3	240	10	8	21
160	25	7.4	21.62	225±10	7	2.7	292	12	8	17
180	6.3	26	6.92	225±10	2.8	1.2	93	6	8	10
180	8	21	8.57	225±10	3.5	1.4	116	8	8	12
180	9	17.6	10.23	225±10	4.1	1.5	138	8	8	13
180	10	17	10.59	225±10	4.2	1.6	143	8	8	14
180	12.5	13.6	13.24	225±10	5.2	1.8	179	10	8	16
180	16	11	16.36	225±10	6.3	2.1	221	10	8	19
180	20	9	20	225±10	7.5	2.5	270	12	8	17
180	25	7.4	24.32	225±10	8.9	2.9	328	12	8	17
200	6.3	26	7.69	225±10	3.5	1.3	104	8	9	11
200	8	21	9.52	225±10	4.3	1.5	129	8	9	13
200	9	17.6	11.36	225±10	5	1.6	153	8	9	14
200	10	17	11.76	225±10	5.2	1.7	159	8	9	15
200	12.5	13.6	14.71	225±10	6.4	2	199	10	9	18
200	16	11	18.18	225±10	7.8	2.3	245	10	9	16
200	20	9	22.22	225±10	9.3	2.7	300	12	9	17
200	25	7.4	27.03	225±10	11	3.2	365	16	9	18
225	6.3	26	8.65	225±10	4.4	1.4	117	8	10	12
225	8	21	10.71	225±10	5.4	1.6	145	8	10	14
225	9	17.6	12.78	225±10	6.4	1.8	173	10	10	16
225	10	17	13.24	225±10	6.6	1.8	179	10	10	16

FX315

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
225	12.5	13.6	16.54	225±10	8.1	2.2	223	10	10	20
225	16	11	20.45	225±10	9.8	2.5	276	12	10	17
225	20	9	25	225±10	11.8	3	338	12	10	18
225	25	7.4	30.41	225±10	13.9	3.5	411	16	10	20
250	6.3	26	9.62	225±10	5.4	1.5	130	8	11	13
250	8	21	11.9	225±10	6.7	1.7	161	8	11	15
250	9	17.6	14.2	225±10	7.9	1.9	192	10	11	17
250	10	17	14.71	225±10	8.1	2	199	10	11	18
250	12.5	13.6	18.38	225±10	10	2.3	248	10	11	16
250	16	11	22.73	225±10	12.2	2.8	307	12	11	17
250	20	9	27.78	225±10	14.5	3.3	375	16	11	19
250	25	7.4	33.78	225±10	17.2	3.9	456	16	11	21
280	6.3	26	10.77	225±10	6.8	1.6	145	8	11	14
280	8	21	13.33	225±10	8.4	1.8	180	10	11	16
280	9	17.6	15.91	225±10	9.9	2.1	215	10	11	19
280	10	17	16.47	225±10	10.2	2.1	222	10	11	19
280	12.5	13.6	20.59	225±10	12.6	2.6	278	12	11	17
280	16	11	25.45	225±10	15.2	3	344	12	11	18
280	20	9	31.11	225±10	18.2	3.6	420	16	11	20
280	25	7.4	37.84	225±10	21.6	4.3	511	20	11	24
315	6.3	26	12.12	225±10	8.6	1.7	164	10	12	15
315	8	21	15	225±10	10.6	2	203	10	12	18
315	9	17.6	17.9	225±10	12.5	2.3	242	10	12	21
315	10	17	18.53	225±10	12.9	2.4	250	10	12	16
315	12.5	13.6	23.16	225±10	15.9	2.8	313	12	12	17
315	16	11	28.64	225±10	19.3	3.4	387	16	12	19
315	20	9	35	225±10	23.1	4	473	16	12	22
315	25	7.4	42.57	225±10	27.3	4.8	575	20	12	27

FX355

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
90	6.3	26	3.46	225±10	0.7	0.8	47	5	6	6
90	8	21	4.29	225±10	0.9	0.9	58	5	6	7
90	9	17.6	5.11	225±10	1	1	69	6	6	8
90	10	17	5.29	225±10	1.1	1	71	6	6	8

FX355

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
90	12.5	13.6	6.62	225±10	1.3	1.2	89	6	6	10
90	16	11	8.18	225±10	1.6	1.3	110	8	6	11
90	20	9	10	225±10	1.9	1.5	135	8	6	13
90	25	7.4	12.16	225±10	2.2	1.7	164	10	6	15
110	6.3	26	4.23	225±10	1.1	0.9	57	5	6	7
110	8	21	5.24	225±10	1.3	1	71	6	6	8
110	9	17.6	6.25	225±10	1.5	1.1	84	6	6	9
110	10	17	6.47	225±10	1.6	1.1	87	6	6	9
110	12.5	13.6	8.09	225±10	1.9	1.3	109	8	6	11
110	16	11	10	225±10	2.4	1.5	135	8	6	13
110	20	9	12.22	225±10	2.8	1.7	165	10	6	15
110	25	7.4	14.86	225±10	3.3	2	201	10	6	18
125	6.3	26	4.81	225±10	1.4	1	65	6	7	8
125	8	21	5.95	225±10	1.7	1.1	80	6	7	9
125	9	17.6	7.1	225±10	2	1.2	96	8	7	10
125	10	17	7.35	225±10	2	1.2	99	8	7	10
125	12.5	13.6	9.19	225±10	2.5	1.4	124	8	7	12
125	16	11	11.36	225±10	3	1.6	153	8	7	14
125	20	9	13.89	225±10	3.6	1.9	188	10	7	17
125	25	7.4	16.89	225±10	4.3	2.2	228	10	7	20
140	6.3	26	5.38	225±10	1.7	1	73	6	7	8
140	8	21	6.67	225±10	2.1	1.2	90	6	7	10
140	9	17.6	7.95	225±10	2.5	1.3	107	8	7	11
140	10	17	8.24	225±10	2.6	1.3	111	8	7	11
140	12.5	13.6	10.29	225±10	3.1	1.5	139	8	7	13
140	16	11	12.73	225±10	3.8	1.8	172	10	7	16
140	20	9	15.56	225±10	4.6	2.1	210	10	7	19
140	25	7.4	18.92	225±10	5.4	2.4	255	10	7	16
160	6.3	26	6.15	225±10	2.2	1.1	83	6	8	9
160	8	21	7.62	225±10	2.7	1.3	103	8	8	11
160	9	17.6	9.09	225±10	3.2	1.4	123	8	8	12
160	10	17	9.41	225±10	3.3	1.4	127	8	8	12
160	12.5	13.6	11.76	225±10	4.1	1.7	159	8	8	15
160	16	11	14.55	225±10	5	2	196	10	8	18
160	20	9	17.78	225±10	5.9	2.3	240	10	8	21
160	25	7.4	21.62	225±10	7	2.7	292	12	8	17

FX355

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
180	6.3	26	6.92	225±10	2.8	1.2	93	6	8	10
180	8	21	8.57	225±10	3.5	1.4	116	8	8	12
180	9	17.6	10.23	225±10	4.1	1.5	138	8	8	13
180	10	17	10.59	225±10	4.2	1.6	143	8	8	14
180	12.5	13.6	13.24	225±10	5.2	1.8	179	10	8	16
180	16	11	16.36	225±10	6.3	2.1	221	10	8	19
180	20	9	20	225±10	7.5	2.5	270	12	8	17
180	25	7.4	24.32	225±10	8.9	2.9	328	12	8	17
200	6.3	26	7.69	225±10	3.5	1.3	104	8	9	11
200	8	21	9.52	225±10	4.3	1.5	129	8	9	13
200	9	17.6	11.36	225±10	5	1.6	153	8	9	14
200	10	17	11.76	225±10	5.2	1.7	159	8	9	15
200	12.5	13.6	14.71	225±10	6.4	2	199	10	9	18
200	16	11	18.18	225±10	7.8	2.3	245	10	9	16
200	20	9	22.22	225±10	9.3	2.7	300	12	9	17
200	25	7.4	27.03	225±10	11	3.2	365	16	9	18
225	6.3	26	8.65	225±10	4.4	1.4	117	8	10	12
225	8	21	10.71	225±10	5.4	1.6	145	8	10	14
225	9	17.6	12.78	225±10	6.4	1.8	173	10	10	16
225	10	17	13.24	225±10	6.6	1.8	179	10	10	16
225	12.5	13.6	16.54	225±10	8.1	2.2	223	10	10	20
225	16	11	20.45	225±10	9.8	2.5	276	12	10	17
225	20	9	25	225±10	11.8	3	338	12	10	18
225	25	7.4	30.41	225±10	13.9	3.5	411	16	10	20
250	6.3	26	9.62	225±10	5.4	1.5	130	8	11	13
250	8	21	11.9	225±10	6.7	1.7	161	8	11	15
250	9	17.6	14.2	225±10	7.9	1.9	192	10	11	17
250	10	17	14.71	225±10	8.1	2	199	10	11	18
250	12.5	13.6	18.38	225±10	10	2.3	248	10	11	16
250	16	11	22.73	225±10	12.2	2.8	307	12	11	17
250	20	9	27.78	225±10	14.5	3.3	375	16	11	19
250	25	7.4	33.78	225±10	17.2	3.9	456	16	11	21
280	6.3	26	10.77	225±10	6.8	1.6	145	8	11	14
280	8	21	13.33	225±10	8.4	1.8	180	10	11	16
280	9	17.6	15.91	225±10	9.9	2.1	215	10	11	19
280	10	17	16.47	225±10	10.2	2.1	222	10	11	19

FX355

dn	PN	SDR	en	Temp.	P1	Bead	t2	t3	t4	t5
mm			mm	°C	bar	mm	s	s	s	min
280	12.5	13.6	20.59	225±10	12.6	2.6	278	12	11	17
280	16	11	25.45	225±10	15.2	3	344	12	11	18
280	20	9	31.11	225±10	18.2	3.6	420	16	11	20
280	25	7.4	37.84	225±10	21.6	4.3	511	20	11	24
315	6.3	26	12.12	225±10	8.6	1.7	164	10	12	15
315	8	21	15	225±10	10.6	2	203	10	12	18
315	9	17.6	17.9	225±10	12.5	2.3	242	10	12	21
315	10	17	18.53	225±10	12.9	2.4	250	10	12	16
315	12.5	13.6	23.16	225±10	15.9	2.8	313	12	12	17
315	16	11	28.64	225±10	19.3	3.4	387	16	12	19
315	20	9	35	225±10	23.1	4	473	16	12	22
315	25	7.4	42.57	225±10	27.3	4.8	575	20	12	27
355	6.3	26	13.65	225±10	11	1.9	184	10	14	17
355	8	21	16.9	225±10	13.4	2.2	228	10	14	20
355	9	17.6	20.17	225±10	15.9	2.5	272	12	14	17
355	10	17	20.88	225±10	16.4	2.6	282	12	14	17
355	12.5	13.6	26.1	225±10	20.2	3.1	352	16	14	18
355	16	11	32.27	225±10	24.5	3.7	436	16	14	20
355	20	9	39.44	225±10	29.3	4.4	532	20	14	25
355	25	7.4	47.97	225±10	34.7	5.3	648	20	14	32



Bead-up pressure = P1+Pt
Heat Soak Pressure = pt
Fusion Jointing Pressure = P1+Pt



8. Maintenance and Inspection

Regular maintenance and inspection are essential to ensure safe operation, consistent welding quality, and long service life of the hydraulic butt fusion welding machine. All maintenance work shall be carried out by qualified personnel in accordance with this chapter.

General Maintenance Guidelines

- Always switch off the machine, disconnect the power supply, and release hydraulic pressure before maintenance.
- Allow the heating plate to cool completely before handling.
- Use only original or approved spare parts.
- Keep the machine clean and free from dust, dirt, and welding residues.
- Record all maintenance and inspection activities.

Daily Inspection

Before and after each working day, perform the following checks:

- Check the general condition of the machine frame and clamps
- Inspect hydraulic hoses and fittings for leaks or damage
- Check electrical cables, plugs, and connectors
- Ensure the pressure gauge and controls are functioning properly
- Clean clamps, facing tool, and heating plate surfaces

Any abnormalities must be corrected before further operation.

Heating Plate Maintenance

- Clean the heating plate surface with a soft, lint-free cloth after use
 - Do not use sharp tools, wire brushes, or abrasive materials
 - Inspect the non-stick coating regularly
 - If the coating is damaged or peeling, stop using the heating plate and replace it
- A damaged heating plate may result in poor fusion quality.

Facing Tool Maintenance

- Inspect facing tool blades regularly for wear or damage
- Replace dull or damaged blades immediately
- Ensure the facing tool rotates smoothly without abnormal noise
- Clean shavings and debris after each use

Proper maintenance of the facing tool is essential for accurate pipe end preparation.

Hydraulic System Maintenance

- Check hydraulic oil level regularly and refill if necessary
- Inspect hydraulic oil for contamination or discoloration
- Inspect hoses, seals, and fittings for leaks or wear
- Replace damaged hydraulic components immediately

Hydraulic oil replacement intervals shall follow manufacturer recommendations.

Electrical System Maintenance

- Inspect electrical components for loose connections or damage
- Ensure all switches and control elements operate correctly
- Keep electrical components dry and protected from moisture
- Repairs to electrical components shall only be performed by qualified electricians

Clamp and Mechanical Component Maintenance

- Clean clamps and guide rods regularly
- Lubricate moving parts according to maintenance requirements
- Check bolts, nuts, and fasteners for tightness
- Inspect mechanical components for deformation or excessive wear

Periodic Inspection

At regular intervals, or according to project requirements, perform a more detailed inspection:

- Check alignment accuracy of clamps
- Verify hydraulic pressure stability
- Verify heating plate temperature accuracy
- Inspect overall machine performance

If any performance deviation is detected, corrective action must be taken.

Storage and Transport Precautions

When the machine is not in use:

- Clean the machine thoroughly
- Protect exposed surfaces from corrosion
- Store the machine in a dry and sheltered location
- Secure all moving parts during transport

Maintenance Responsibility

The owner or operator is responsible for ensuring:

- Maintenance is performed as specified
- Only qualified personnel carry out service work
- Maintenance records are kept and available



9. Troubleshooting

This chapter describes common problems that may occur during operation of the hydraulic butt fusion welding machine, their possible causes, and recommended corrective actions. Proper troubleshooting helps reduce downtime and ensures consistent welding quality.

General Troubleshooting Guidelines

- Stop the machine immediately if abnormal operation is observed.
- Disconnect the power supply and release hydraulic pressure before inspection or repair.
- Allow the heating plate to cool before handling.
- Troubleshooting and repair shall be performed by qualified personnel.
- If the problem cannot be resolved, contact the manufacturer or authorized service personnel.

Welding Quality Problems

Problem: Fusion bead is uneven or asymmetrical

Possible causes:

- Pipes are misaligned in the clamps
- Uneven facing or insufficient trimming
- Incorrect fusion pressure

Corrective actions:

- Recheck pipe alignment and clamp installation
- Repeat the facing process
- Adjust fusion pressure according to reference values

Problem: Fusion bead is too small

Possible causes:

- Insufficient heating time
- Heating plate temperature too low
- Fusion pressure too low

Corrective actions:

- Increase heating time
- Verify heating plate temperature
- Increase fusion pressure gradually

Problem: Fusion bead is too large

Possible causes:

- Excessive heating time
- Heating plate temperature too high
- Fusion pressure too high

Corrective actions:

- Reduce heating time
- Lower heating plate temperature
- Reduce fusion pressure

Problem: Cracks or voids in the weld

Possible causes:

- Contaminated pipe ends
- Excessive changeover time
- Movement during cooling

Corrective actions:

- Ensure pipe ends are clean and untouched after facing
- Reduce changeover time
- Maintain pressure and avoid disturbance during cooling

Heating Plate Problems

Problem: Heating plate does not reach set temperature

Possible causes:

- Power supply issue
- Faulty temperature controller
- Heating element failure

Corrective actions:

- Check power supply and electrical connections
- Inspect temperature controller
- Replace heating element if necessary

Problem: Heating plate does not reach set temperature

Possible causes:

- Damaged or worn non-stick coating
- Contaminated heating plate surface

Corrective actions:

- Clean heating plate with approved method
- Replace heating plate or recoat surface if damaged

Facing Tool Problems

Problem: Facing tool does not rotate

Possible causes:

- Power supply issue
- Motor or switch failure

Corrective actions:

- Check electrical connections
- Inspect motor and switch
- Contact service personnel if required

Problem: Uneven or rough pipe end surface after facing

Possible causes:

- Dull or damaged blades
- Insufficient facing pressure

Corrective actions:

- Replace or sharpen blades
- Increase facing pressure slightly

Hydraulic System Problems

Problem: Hydraulic pressure cannot be built up

Possible causes:

- Low hydraulic oil level
- Hydraulic oil leakage
- Faulty hydraulic pump or valve

Corrective actions:

- Check and refill hydraulic oil
- Inspect hoses and fittings for leaks
- Repair or replace faulty components

Problem: Hydraulic pressure fluctuates

Possible causes:

- Air in hydraulic system
- Worn seals or valves

Corrective actions:

- Bleed air from the hydraulic system
- Inspect and replace worn components

Problem: Hydraulic oil leakage

Possible causes:

- Loose connections
- Damaged hoses or seals

Corrective actions:

- Tighten connections
- Replace damaged hoses or seals immediately

Electrical System Problems:

Machine does not start

Possible causes:

- No power supply
- Blown fuse or tripped breaker
- Faulty switch

Corrective actions:

- Check power supply
- Replace fuse or reset breaker
- Inspect and replace switch if necessary

Service Support

If troubleshooting steps do not resolve the issue, contact the manufacturer or authorized service center.

Provide the following information:

- Machine model and serial number
- Description of the problem
- Operating conditions