DRISCOPIPE®

Heat Fusion Qualification Guide

Driscopipe® 6500 Gas Distribution Piping Systems

This brochure has been developed to assist those responsible for fusion joining Driscopipe® 6500 Gas Piping Systems in meeting the requirements of Title 49 of the code of Federal Regulations §192.285 as it applies to heat fusion.

The regulations require each operator to ensure that every individual performing fusion joining is qualified in the use of the recommended fusion procedure(s) by the following:

I. Appropriate training or experience in the use of the fusion procedure, and

II. Making a sample joint according to the procedure that passes the following inspections and tests:

A. The joint must be visually examined during and after joining, and found to have the same appearance as a photograph or sample of an acceptable joint that was joined in accordance with the procedure; and

B. The joint must be tested or examined by one of the following methods:

1. Pressure and tensile test as described in 49 C.F.R. §192.283; or
2. Ultrasonic inspection and found to be free of flaws that would cause failure; or
3. Cut into at least three longitudinal straps, each of which is:
   a. Visually examined and found to be free of voids or unbonded areas on the cut surface of the joint, and
   b. Deformed by bending, torque or impact and if failure occurs, it must not initiate in the joint area.

C. A person must be requalified under an acceptable procedure, if, during any twelve month period he –

1. Does not make any joints under the procedure; or
2. Has three joints or three percent of the joints he has made, whichever is greater, that are found unacceptable by testing under 49 C.F.R. §192.513.

This brochure provides photographs of acceptable and unacceptable joints and illustrates the use of cut straps for inspection and testing of the joint.

The fusion procedures recommended in this brochure have been qualified in accordance with 49 C.F.R. §192.283.

Individuals who demonstrate their ability to follow the recommended fusion procedures and produce acceptable fusion joints as illustrated in this brochure should meet the requirements for qualification under 49 C.F.R. §192.285 as it applies to heat fusion of the Driscopipe 6500 Gas Piping Systems.

Caution: Static Electricity – Static electricity charges are generated on polyethylene pipe by friction, particularly during the handling of pipe in storage, shipping and installation. The flow of air or gas containing dust or scale will also build up significant static charges, as will the flow of dry materials through the pipe, such as in the case of gravity flow grain chutes. These charges are a safety hazard, particularly in areas where there is leaking gas, or an explosive atmosphere.

Plastic pipe is a non-conductor of electricity and the static charge will remain in place until some grounding device comes close enough to allow it to discharge.

The discharge of these static electric charges generally happens when workmen touch the pipe themselves or upon application of mechanical tools to the pipe. The result of the discharge will vary from an insignificant physical shock to possible ignition of a flammable gas-air mixture. The most effective and simple method to minimize the hazard to the discharge is to apply a film of water to the work surface, to drain away the static electricity. A ground wire on the plastic pipe will only discharge from that point, since the plastic is a non-conductor.

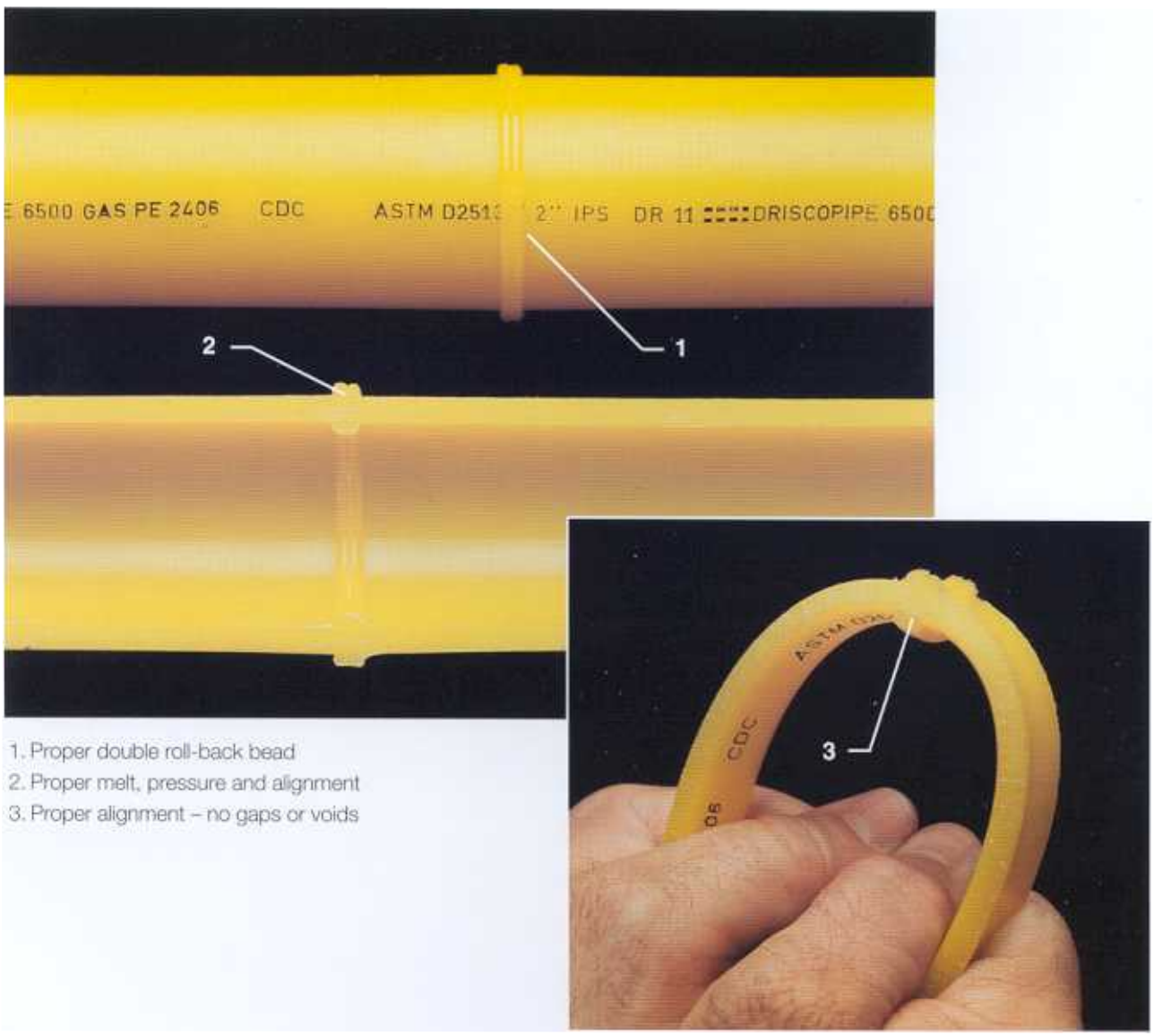
When workmen must enter a bellhole to hot tap a line or make emergency repairs to a damaged or leaking line, it is important that all safety precautions be observed. The exposed working surface of the polyethylene line should be doused with water before entering the area and a wet cloth should be kept on the pipe to drain off static charge build up while working on the line.

Heat Fusion Joining: High Integrity, High Reliability

Driscopipe 6500 High Molecular Weight, Medium Density Polyethylene Gas Distribution Systems are joined by the heat fusion technique commonly called "butt", "sidewall" and socket fusion. These are simple, visual procedures with straightforward, uncomplicated instructions. Heat fusion techniques are recognized in the industry as joining systems of very high integrity and reliability. They are cost effective. Butt fusion does not require couplings. Joints are stronger than the pipe itself in both tension and pressure conditions.

In the mid-1950s following its first commercial production of high density polyethylene piping material, Phillips Petroleum Company was one of the first to design, develop and build fusion equipment for polyethylene piping systems. Heat fusion joining proved so successful that Phillips rapidly developed more sophisticated equipment and continued this developmental activity through the late 60s. Since that time, with Phillips guidance, other firms have developed an extensive line of reliable, readily available fusion equipment. There are thousands of Driscopipe 6500 fusion joints in service today giving dependable, trouble-free performance. The modern day heat fusion joint is basically the same joint made in 1956 . . . only the fusion equipment has evolved to gain efficiency, reliability,and convenience.

Butt Fusion of Pipe
Acceptable Appearance



1. Proper double roll-back bead
2. Proper melt, pressure and alignment
3. Proper alignment – no gaps or voids

Butt Fusion Procedure for Pipe, Tubing & Fittings

1. Clean each pipe end with a clean cotton cloth.
2. Square (face) end of each pipe to be fused.
3. Check line-up of the pipe ends. Adjust the high-low. Check for voids and gaps. Check heater plate for the proper surface temperature, and clean surface with a clean cotton* cloth.
   Surface Temperature: 375°F – 400°F**
4. Insert the heater plate between the aligned ends and bring the ends firmly in contact with the plate, but *DO NOT APPLY PRESSURE* while achieving melt pattern. Watch for proper melt.
5. Remove heater plate after achieving the proper melt and quickly examine the heated ends for completeness of melt. If the ends are not properly melted, stop the procedure, remove the melted ends and start over at Step 1.
6. Bring melted ends together rapidly. *DO NOT SLAM. APPLY ONLY ENOUGH PRESSURE TO FORM A DOUBLE ROLL-BACK BEAD.*
7. Allow the butt fusion joint to cool properly while maintaining pressure (until your finger can remain comfortably on the bead).

* Avoid polyester-type materials which melt and stick to heater plates.

** Surface temperature of 500°F is optional, but extreme care must be exercised to avoid overmelt, overpressure and cold fusions

Remember

Install proper inserts in the fusion unit for the pipe, tubing or fittings being joined. A quality butt fusion joint has a double bead rolled back to the body of the pipe.

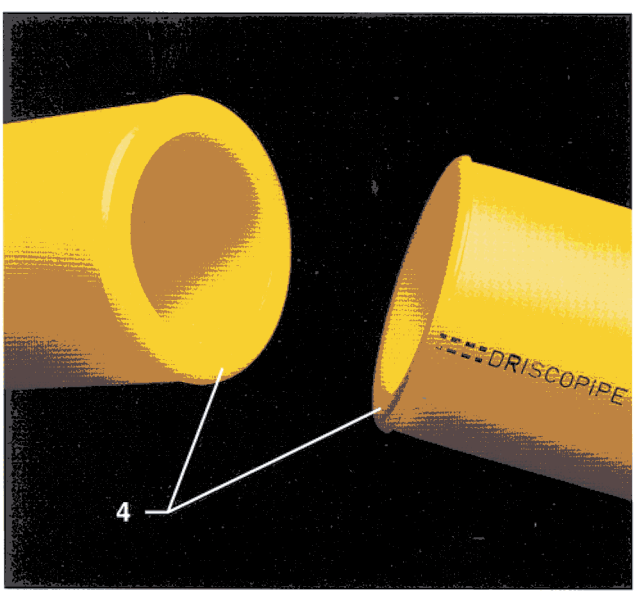
Heater plates should be double checked with a tempilstik or pyrometer for correct *surface temperature* (375°F–400°F).

Butt Fusion Qualification Procedure

1. Observe the joining process to determine that the proper procedure is being followed.
2. Visually inspect the joint and compare it to a sample or picture of an acceptable joint.
3. Allow the joint to cool for at least one hour.
4. Cut the sample through the joint area, lengthwise of the pipe, into at least three straps.
5. Visually inspect the cut surface of the pipe wall at the joint for voids or unbonded areas.
6. Bend the sample 180°.
7. Make another joint if failure occurs or if flaws are observed in the joint. Compare the appearance with pictures of poor joints and recheck the procedure.

Butt Fusion of Pipe

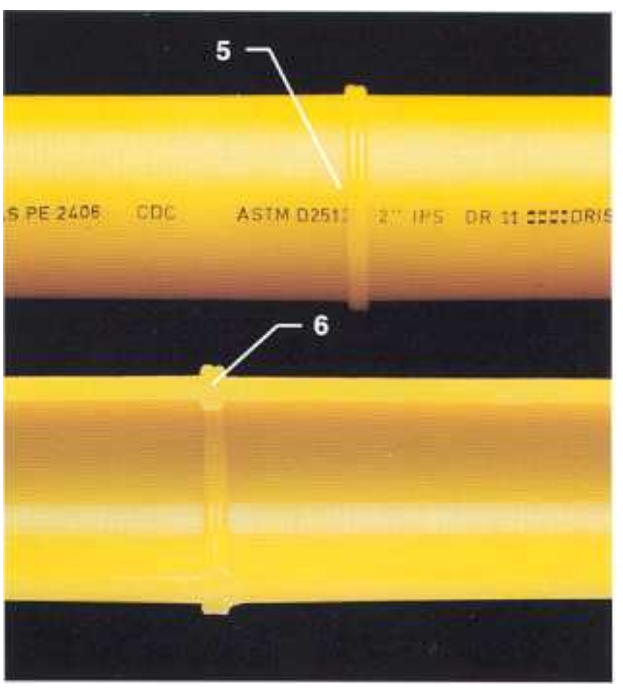
Acceptable Appearance



4. Proper melt ends after heat soak

Butt Fusion of Tubing

Acceptable Appearance



5. Proper double roll-back bead
6. Proper melt, pressure and alignment

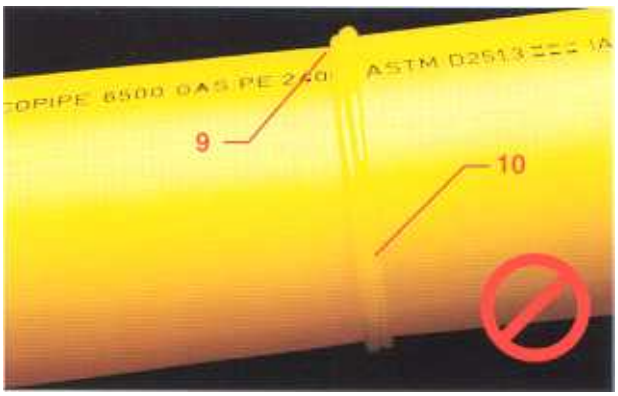
Butt Fusion of Pipe

Unacceptable Appearance: Incomplete Roll Back

7. Insufficient fusion pressure – "V" shaped melt appearance
8. Incomplete roll back of bead

Butt Fusion of Pipe

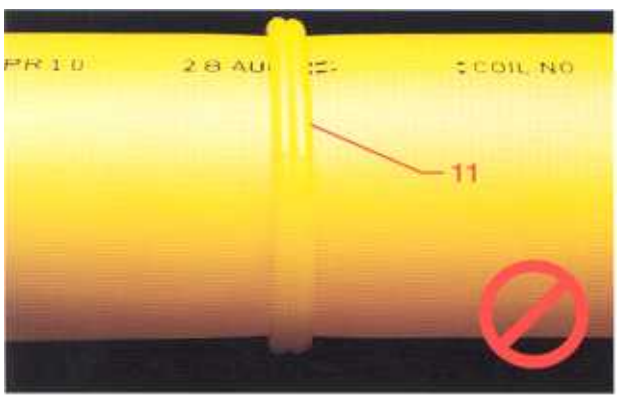
Unacceptable Appearance: Improper Alignment



9. "High-low" condition
10. Incomplete roll back of bead due to improper alignment

Butt Fusion of Pipe

Unacceptable Appearance:



11. Excessive melt and/or excessive pressure

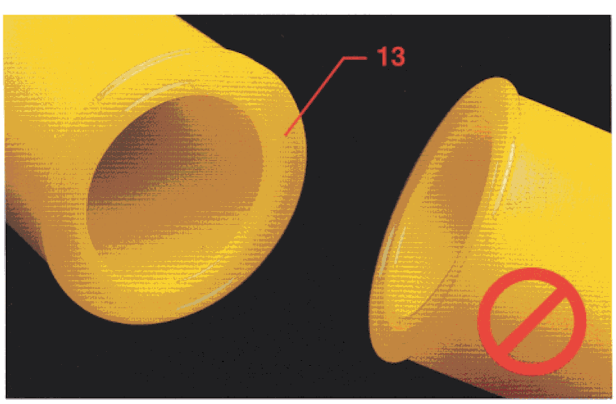
Butt Fusion of Pipe

Unacceptable Appearance: Incomplete Face Off

12. No melt bead caused by incomplete face off

Butt Fusion of Pipe

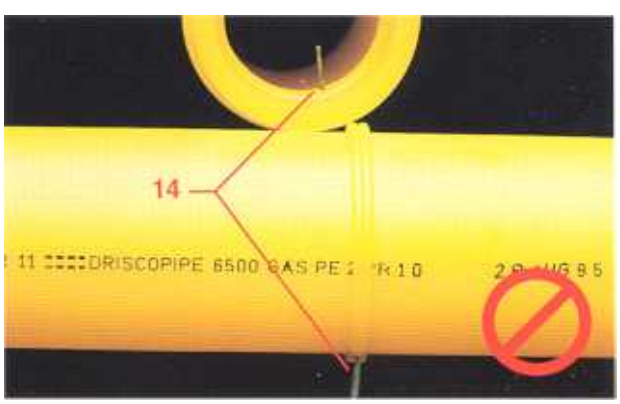
Unacceptable Appearance: Cold Joint



13. Cold joint

Butt Fusion of Tubing

Unacceptable Appearance



14. Foreign object in the melt bead

Sidewall Fusion Procedure

It is recommended that an application tool be used when making a sidewall fusion. Variables in the installation procedure are more easily controlled when a tool is used than when the fusion is made manually.

1. Install the fusion machine on the pipe (main).
2. Clean the pipe with a clean cotton cloth. Prepare the surface of the pipe by roughing it with 60 grit or coarser utility cloth.
3. Prepare the saddle base of the tee (side fitting) by cleaning and roughing it with 60 grit or coarser utility cloth.
4. Align the fitting on the main and tighten the clamp (insert adapter) on the fitting stem while applying slight downward pressure on the fitting.
5. Check the saddle base for square alignment on the main.
6. Clean the face of the heater adapters with a clean cotton* cloth. Check heater plate for the proper *surface temperature* (475°F – 500°F). Raise the fitting. Roll in and center the heater plate with the adapter between the base of the fitting and the main.
7. For all sizes, apply a strong, firm, continuous pressure until a complete melt can be seen on the main. Release the pressure to zero pressure. Continue the heat soak cycle on the fitting and the main. Watch the base of the fitting for proper melt:

Main Sizes	Heat Soak Cycle Fitting Melt
1 1/4"	1/16" Melt
2"	1/8" Melt
3"	3/16" Melt
4" & larger	3/16" – 1/4" Melt

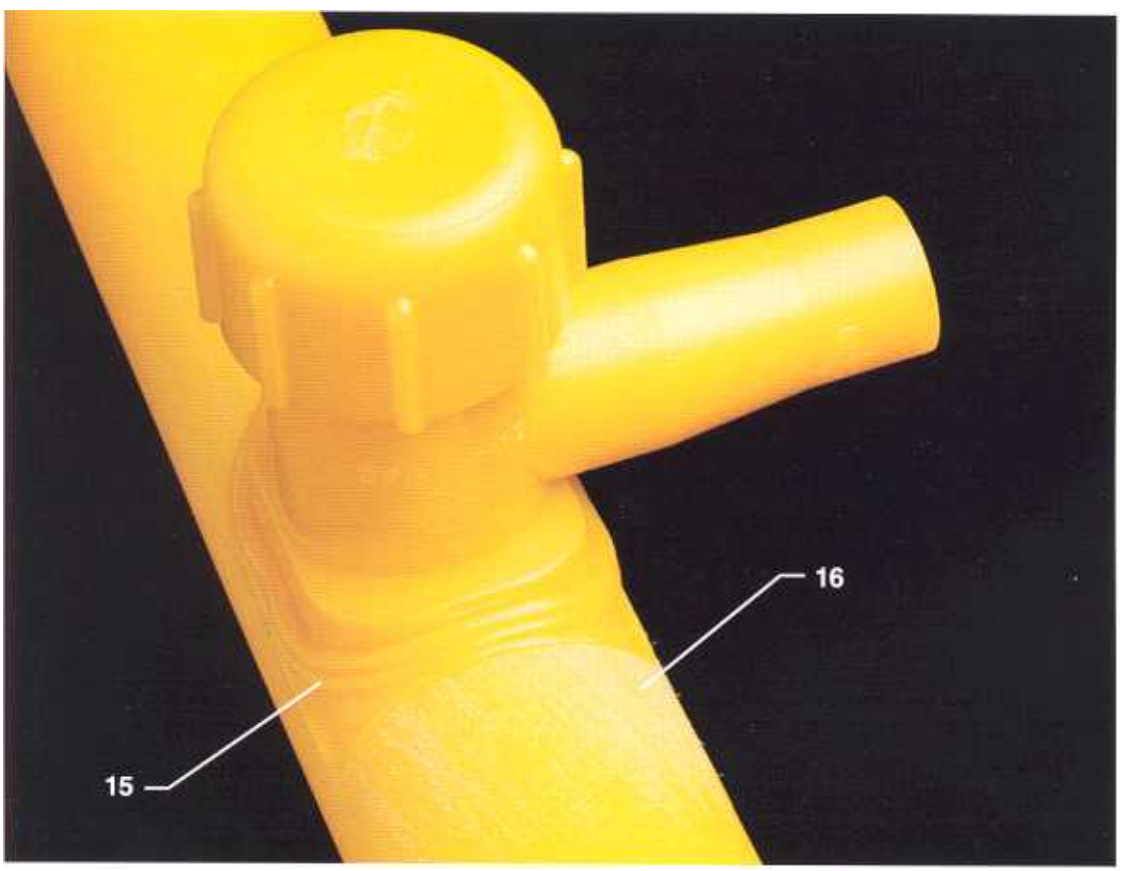
8. Raise the fitting and cleanly remove the heater plate.
9. Quickly examine both melted surfaces. If either melt pattern is not complete, continue the fusion process and cut off both the stack of the tee and the outlet to prevent future use. Move to an adjacent spot on the main and begin at Step 1 again.
10. Bring melted surfaces together rapidly. *DO NOT SLAM*, apply continuous, progressive pressure** until the third bead appears. Maintain this pressure until the joint has cooled (until your finger can remain comfortably on bead).

* Avoid polyester-type materials which melt and stick to heater plates.

** See table an page 8.

Sidewall Fusion

2 Inch or Larger Pipe: Acceptable Appearance



15. Proper melt, pressure and alignment.
16. Proper pipe surface preparation

Remember

Install the proper sidewall and fittings inserts in the fusion unit for the pipe and fittings being joined.

Be sure correct sidewall adapters are installed on the heater plate.

A quality side fusion joint has a uniform, well-aligned appearance all around.

Heater plate should be checked periodically with a tempilstik or pyrometer for correct *surface temperature* (475 – 500°F).

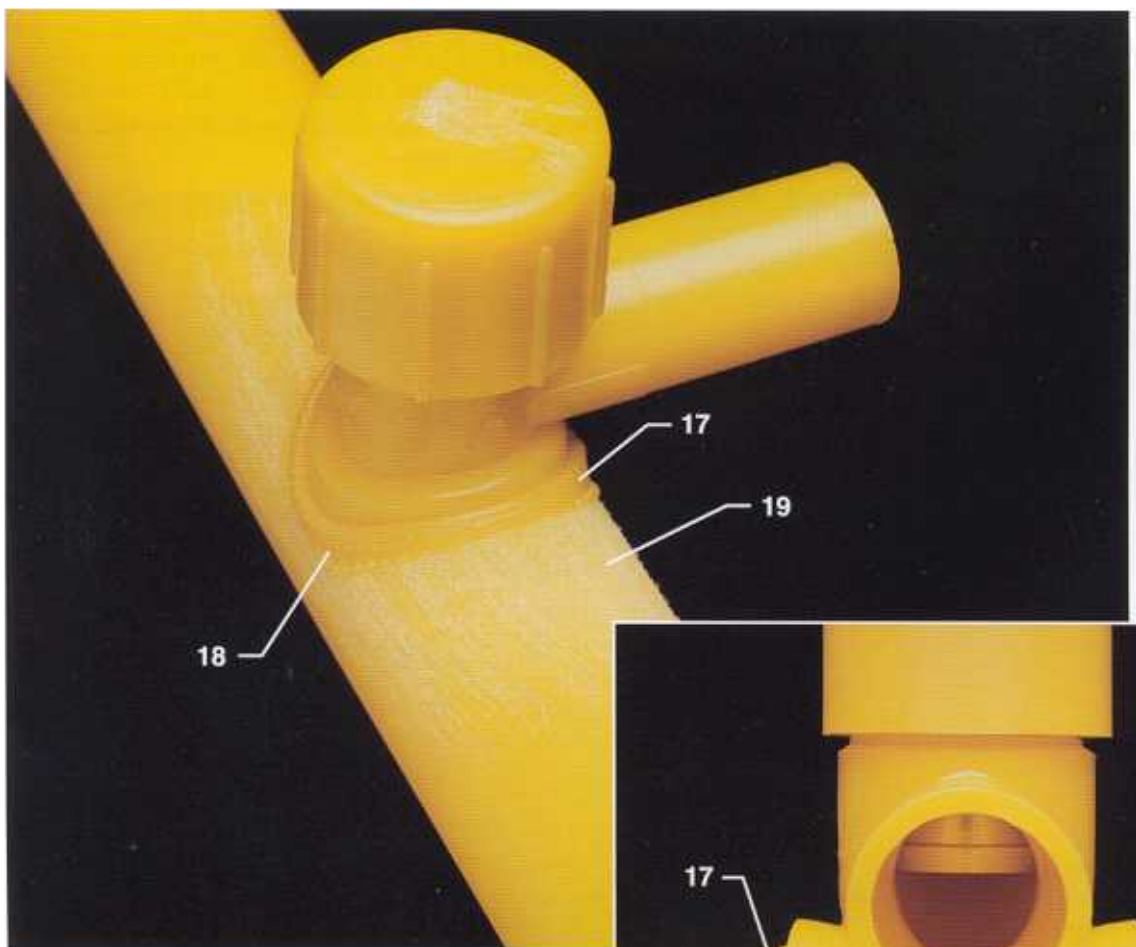
Use of Heating Time Cycle is optional. See page 8.

Sidewall Fusion Qualification Procedure

1. Observe the joining process to determine that the proper procedure is being followed.
2. Visually inspect the joint and compare it to a sample or picture of an acceptable joint.
3. Allow the joint to cool for at least one hour.
4. Cut the sample through the joint area, lengthwise of the pipe, into at least three straps.
5. Visually inspect the cut surface of the pipe wall at the joint for voids or unbonded areas.
6. Bend the sample 180°.
7. Make another joint if failure occurs or if flaws are observed in the joint. Compare the appearance with pictures of poor joints and recheck the procedure.

Sidewall Fusion

2 Inch or Larger Pipe: Acceptable Appearance



17. Proper melt, pressure and alignment
18. Serrated heater adapters used
19. Proper pipe surface preparation

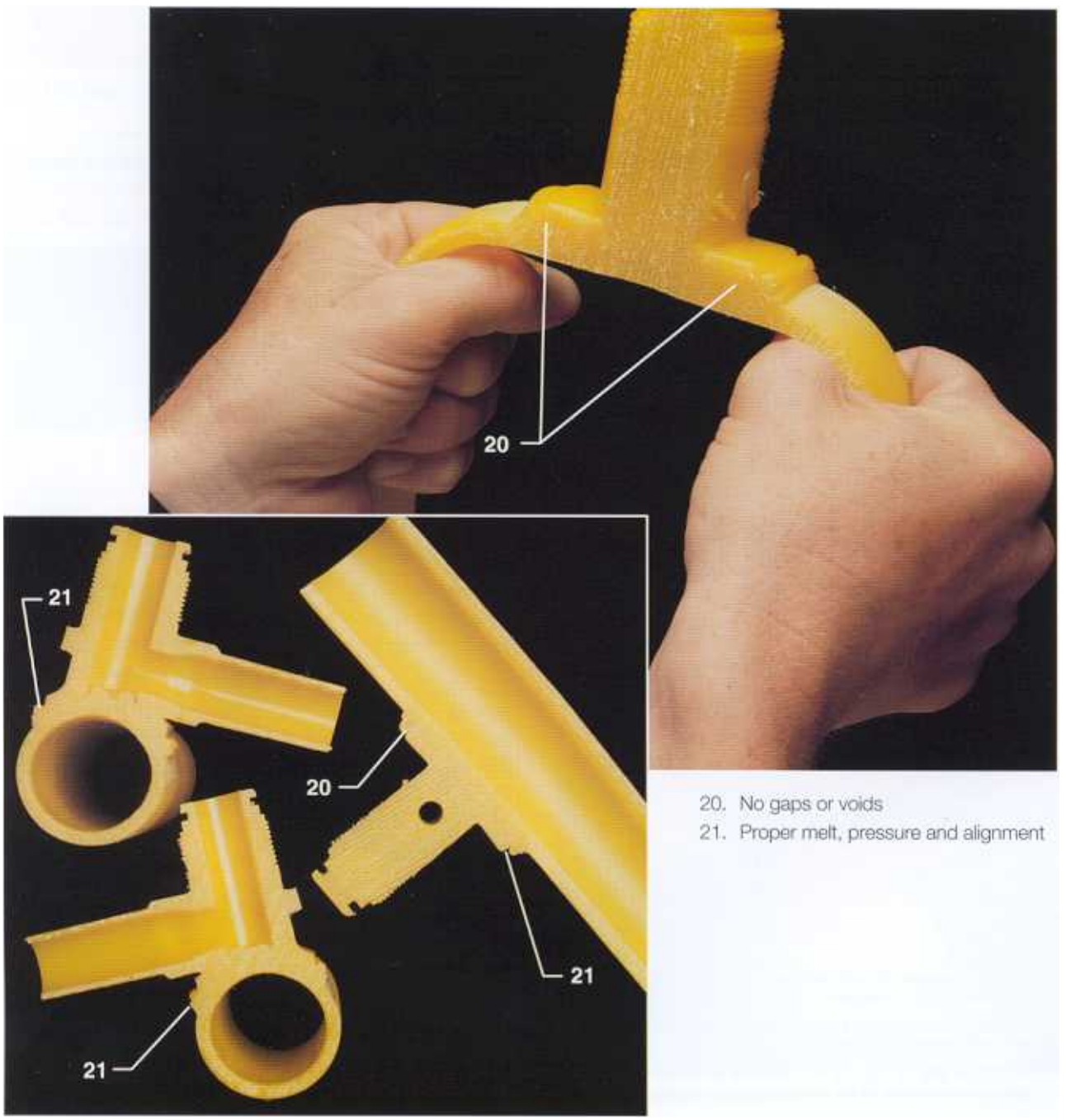
Fusion Parameters

Acceptable fusion joints depend on visual verification of adequate melt and pressure parameters as outlined in the Driscopipe 6500 procedure. The following force gauge readings and heat soak time cycles are suggested to obtain the optimum sidewall fusion.

After the melt pattern is established, the pressure should be reduced to "0" during the heat soak time cycle. After the joint is made, the fusion pressure ranges listed should be maintained until the joint has solidified with the fusion unit left in place until the joint has cooled thoroughly. The pressure shown is actual pressure. To obtain the gauge pressure, contact the fusion unit manufacturer.

Sidewall Fusion

2 Inch or Larger Pipe: Acceptable Appearance



20. No gaps or voids
21. Proper melt, pressure and alignment

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Heating Time Cycles for Driscopipe® 6500*

Main Size (inches)	Pressure to Establish Melt Pattern (psi)	Heat Soak Time (sec)	Fusion Pressure (psi)
Driscopipe® 6500 – Butt Fused (Round Base) or Socket Fused (Rectangular Base) Tapping Tees 1" IPS Outlet or below			
1 1/4	150 – 175	5 – 10	60 – 80
2	150 – 175	5 – 15	70 – 90
3	175 – 200	15 – 30	80 – 100
4	175 – 200	15 – 30	80 – 100
6	200 – 225	20 – 35	110 – 130
8	225 – 250	25 – 40	120 – 140
Driscopipe® 6500 – 1 1/4" IPS Outlet Tapping Tee			
2	175 – 200	8 – 15	175 – 200
3	200 – 225	15 – 30	200 – 225
4	225 – 250	20 – 40	225 – 250
6	250 – 275	30 – 50	250 – 275
8	275 – 300	40 – 60	275 – 300
Driscopipe® 6500 – Large Base 2" IPS Outlet Tapping Tee			
2	225 – 275	12 – 20	225 – 275
3	275 – 325	20 – 40	275 – 325
4	325 – 375	30 – 45	325 – 375
6	375 – 425	45 – 60	375 – 425
8	425 – 475	60 – 80	425 – 475

Nominal Size IPS (in) Main x Branch	Pressure to Establish Melt Pattern (psi)	Heat Soak Time (sec)	Fusion Pressure (psi)
Driscopipe® 6500 Branch Saddles – *Butt Fusion*			
2 x 2	140 – 160	7 – 13	140 – 160
3 x 2	140 – 160	15 – 25	140 – 160
4 x 2	160 – 180	25 – 35	160 – 180
6 x 2	175 – 190	40 – 50	350 – 380
4 x 3	350 – 380	30 – 45	350 – 380
6 x 3	380 – 410	45 – 60	380 – 410
6 x 4	630 – 680	60 – 90	630 – 680
Driscopipe® 6500 Branch Saddles – *Socket Fusion***			
2 x 2	225 – 275	12 – 20	225 – 275
3 x 2	275 – 325	20 – 40	275 – 325
4 x 2	325 – 375	30 – 45	325 – 375
6 x 2	375 – 425	45 – 60	375 – 425
8 x 2	425 – 475	60 – 80	425 – 475
Driscopipe® 6500 Service Saddles***			
1 1/4 x 1	150 – 175	5 – 10	60 – 80
2 x 1	150 – 175	5 – 15	70 – 90
3 x 1	175 – 200	15 – 30	80 – 90
4 x 1	175 – 200	15 – 30	80 – 100

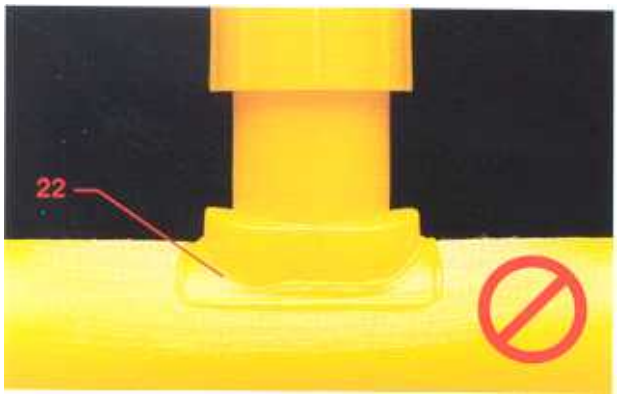
* Heating time cycles are to be used as a guide only. The actual time required to develop adequate melt for joining will depend on temperature and wind conditions. Acceptable visual indications of adequate melt are required regardless of the timing cycle indicated.

** 1 1/4 branch outlets require the same fusion times and pressures as corresponding 2" IPS branch outlets, as base configuration remains the same for both outlet sizes.

*** 1" CTS, 3/4" IPS, 1/2" IPS and 1/2" CTS outlet service saddles require the same fusion times and pressures as corresponding 1" IPS outlet service saddles, as the base configuration remains the same for all outlet sizes.

Sidewall Fusion – 2-Inch or Larger Pipe

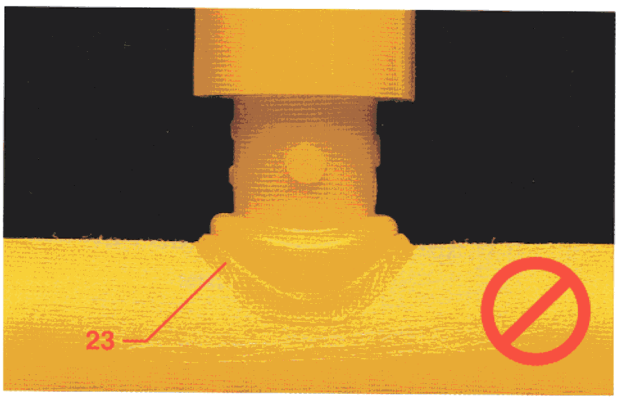
Unacceptable Appearance: Insufficient Melt



22. Melt bead too small and insufficient fusion pressure

Sidewall Fusion – 2-Inch or Larger Pipe

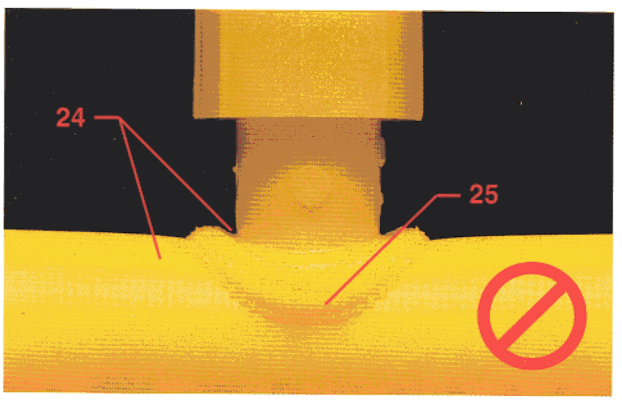
Unacceptable Appearance: Insufficient Melt



23. Melt bead too small on round base tapping tee

Sidewall Fusion – 2-Inch or Larger Pipe

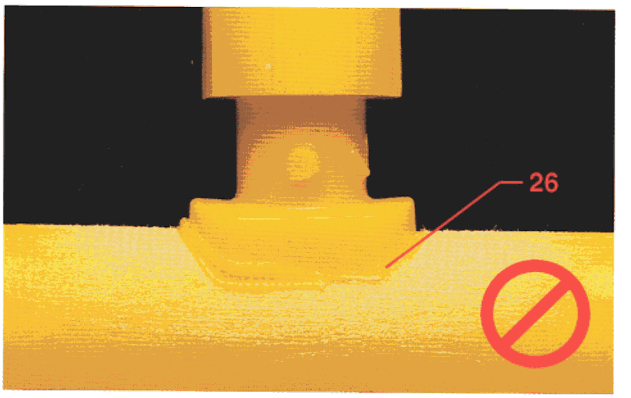
Unacceptable Appearance: Insufficient Melt and Pressure



24. Melt bead is above base of fitting; Main not prepared
25. Excessive melt bead size

Sidewall Fusion – 2-Inch or Larger Pipe

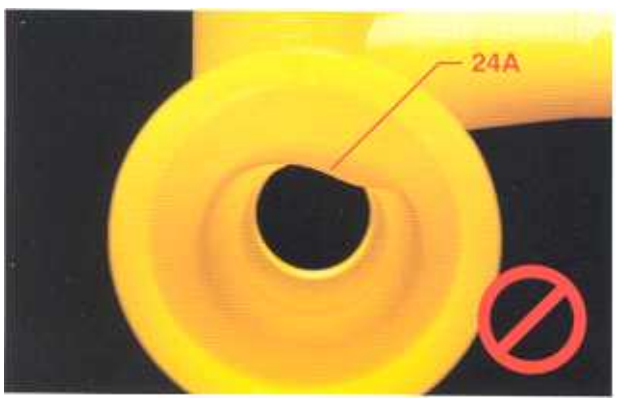
Unacceptable Appearance: Misalignment



26. Gap due to incomplete melt resulting from misalignment

Sidewall Fusion – 2-Inch or Larger Pipe

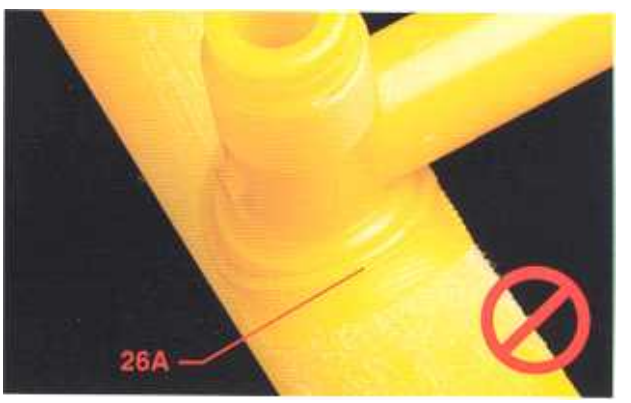
Unacceptable Appearance: Excessive Melt



24A. Excessive melt

Sidewall Fusion – 2-Inch or Larger Pipe

Unacceptable Appearance: Melt Pattern Misalignment



26A. Melt pattern misalignment

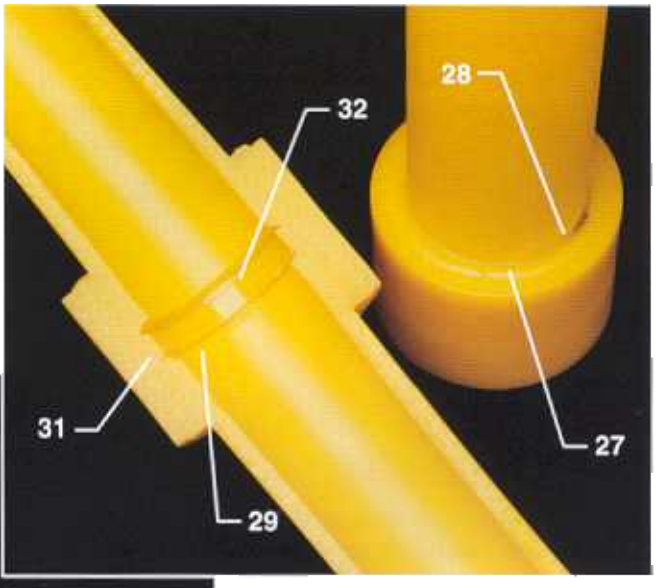
Socket Fusion Procedure for Pipe, Tubing & Fittings

1. Clean each pipe or tubing end with a clean cloth.
2. Square the end of the pipe or tubing with a pipe or tubing cutter.
3. Chamfer the end of 1¼" and larger pipe sizes with a chamfering tool. It is also advisable to chamfer smaller sizes.
4. Install a depth gauge on the pipe.
5. Attach a cold ring immediately behind the depth gauge.
6. Attach a fitting puller to 2" or larger fittings.
7. Check the heating tool for the proper *surface temperature* (500F ± 10°F) and clean with a clean cotton* cloth.
8. Firmly seat the heater adapter into the fitting first and immediately insert the pipe or tubing fully into the other heater adapter.
9. Begin the time cycle when the cold ring, heater and fitting are in firm contact.
10. At the end of the time cycle, snap the fitting from the heater and then the heater from the pipe.
11. Quickly inspect the melt pattern on the pipe and the fitting. Stop the procedure if either melt pattern is not complete, discard the fitting, cut off the pipe end and start over at Step 1
12. Push the fitting firmly and squarely onto the end of the pipe and against the cold ring. Do not twist or turn the fitting or the pipe.
13. Hold the fitting and pipe firmly in place without any twisting action for the recommended cooling time.
14. Release the cold ring and the fitting puller.
15. Allow the joint to cool an additional 3 minutes before handling and 10 – 30 minutes before pressure testing or plowing in.

* Avoid polyester-type materials which melt and stick to heater plates.

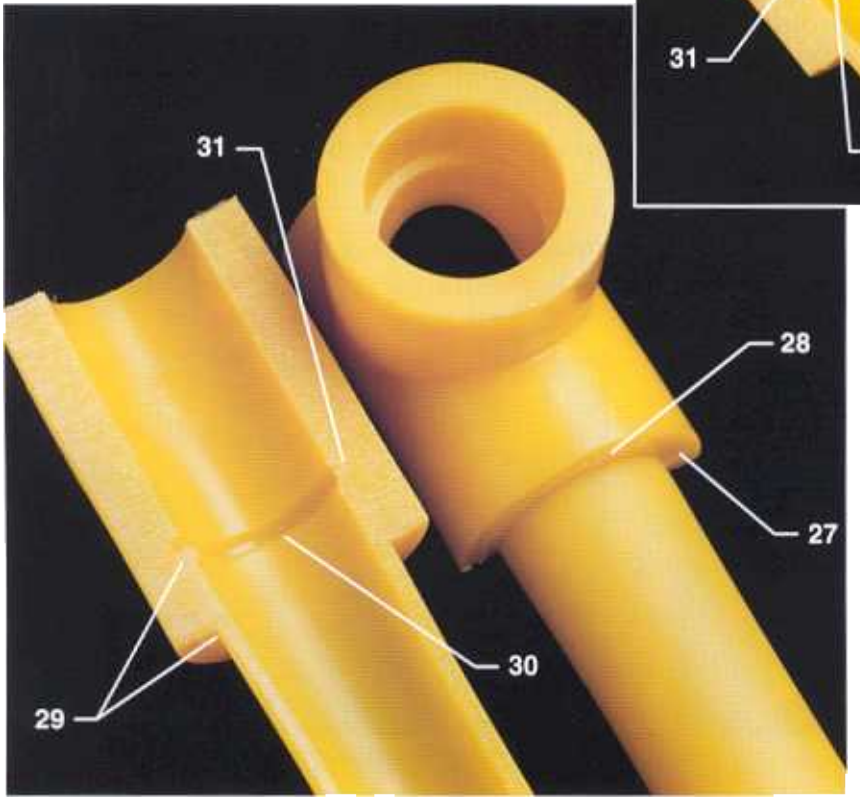
Socket Fusion of Tubing

Acceptable Appearance



Socket Fusion of Pipe

Acceptable Appearance



27. Melt bead flattened by cold ring
28. No gaps or voids
29. Proper insertion depth
30. Complete internal melt bead
31. No cracks, gaps or voids
32. Acceptable internal fusion bead

Socket Fusion Heating Time Cycles

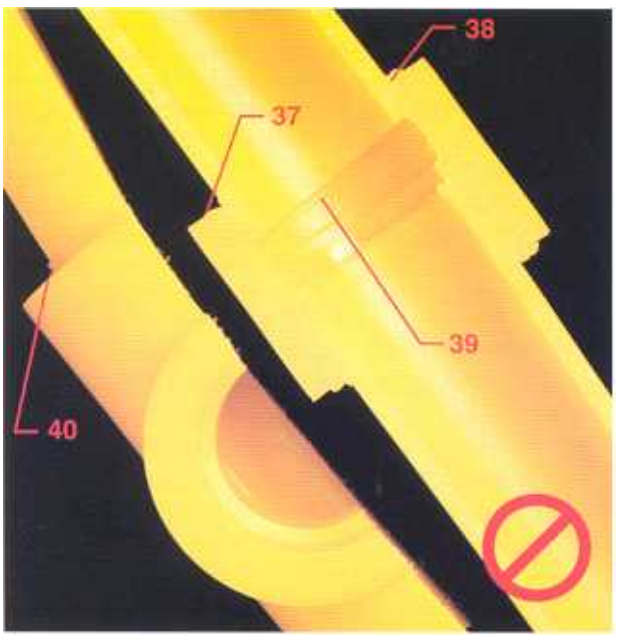
Pipe Size (in)	Heating Time (sec)	Cooling Time (sec)
1/2 CTS	5 – 7	20
1 CTS	8 – 12	20
1/2 IPS	5 – 10	20
3/4 IPS	8 – 12	20
1 IPS	8 – 12	20
1 1/4 IPS	12 – 16	30
2 IPS	12 – 20	30
3 IPS	15 – 25	30
4 IPS	20 – 25	30

Socket Fusion Qualification Procedure

1. Observe the joining process to determine that the proper procedure is being followed.
2. Visually inspect the joint and compare it to a sample or picture of an acceptable joint.
3. Allow the joint to cool for at least one hour.
4. Cut the sample through the joint area, lengthwise of the pipe, into at least three straps.
5. Visually inspect the cut surface of the pipe wall at the joint for voids or unbonded areas.
6. Bend the sample 180°.
7. Make another joint if failure occurs or if flaws are observed in the joint. Compare the appearance with pictures of poor joints and recheck the procedure.

Socket Fusion of Pipe

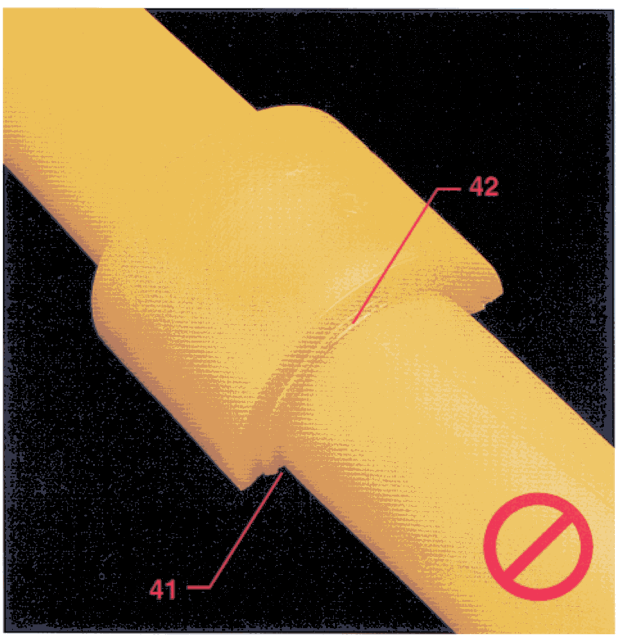
Unacceptable Appearance: No Depth Gauge and Misalignment



37. Melt bead too small and insufficient fusion pressure
38. Gap
39. Improper insertion depth
40. Misalignment

Socket Fusion of Pipe

Unacceptable Appearance: No Cold Ring



41. Melt bead not flattened against fitting
42. Dirty heater plate – Burnt material

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Caution

Driscopipe has been used safely in thousands of applications. There are precautions that should be adhered to when using any product and in this respect Driscopipe is no different. The following is a listing of some of the cautions that should be considered when using Phillips Driscopipe products.

Fusion

During the heat fusion process the equipment and pipe product may reach temperatures in excess of 400°F. Caution should be taken to prevent burns.

* Review heat fusion cards, Engineering Manual and Heat Fusion Guide.

Weight

Although HDPE is not as heavy as some alternative pipe products, there can be significant weight involved. Care should be exercised when handling or working around HDPE pipe.

* Review size and dimensions sheets and Phillips Driscopipe Recommendations for Handling and Unloading sheet.

Air Pressure

High air pressure is not recommended for use in HDPE pipe for testing. HDPE pipe should not be used for process air. Consult your supplier for additional precautions.

* Review Engineering Manual.

Static Electricity

High static electricity charges can be associated with HDPE pipe products. Improper use of pinch-off equipment in gaseous areas can be extremely dangerous.

* Review Engineering Manual, Driscopipe 8100 brochure.

Unloading

Assure that proper equipment is used when unloading pipe. The equipment should be of a size to handle the loads and the condition of all straps should be checked.

* Review Engineering Manual, and Phillips Driscopipe Recommendations for Handling and Unloading sheet.

Burial

Consult the appropriate authority on trench construction requirements. All safety precautions should be taken when working in a trench.

* Review Engineering Manual.

Testing

Water is the recommended test medium. All safety precautions for pipe movement or breakage during testing should be taken.

* Review Engineering Manual.

Impact or Hitting

HDPE pipe is impact resistant. Any hitting of the pipe with an instrument, such as a hammer, may result in uncontrolled rebound.

* Review data/physical properties sheet and Driscopipe 8100 brochure.

Product Consideration

Some products are not recommended for use in HDPE pipe systems. Consult your supplier for a listing of chemical resistance.

* Review Engineering Manual, and Phillips Marlex TIB 2 brochure.

Coils

Coiled HDPE pipe may contain energy as in a spring. Uncontrolled release, i.e., cutting of straps, can result in dangerous uncontrolled forces. All safety precautions and the proper equipment is required.

* Review Phillips Driscopipe Recommendations for Handling and Unloading sheet.

§192.283 Plastic Pipe; Qualifying Joining Procedures

(a) *Heat Fusion, Solvent Cement and Adhesive Joints.* Before any written procedure established under §192.273(b) is used for making plastic pipe joints by a heat fusion, solvent cement, or adhesive method, the procedure must be qualified by subjecting specimen joints, made according to the procedure, to the following tests:

(1) The burst test requirements of –
(i) In the case of thermoplastic pipe, paragraph 8.6 (Sustained Pressure Test) or paragraph 8.7 (Minimum Hydrostatic Burst Pressure) of ASTM D2513; or
(ii) In the case of thermosetting plastic pipe, paragraph 8.5 (Minimum Hydrostatic Burst Pressure) or paragraph 8.9 (Sustained Static Pressure Test) of ASTM D2517;

(2) For procedures intended for lateral pipe connections, subject a specimen joint made from pipe sections joined at right angles according to the procedure to a force on the lateral pipe until failure occurs in the specimen. If failure initiates outside the joint area, the procedure qualifies for use; and

(3) For procedures intended for nonlateral pipe connections, follow the tensile test requirements of ASTM D638, except that the test may be conducted at ambient temperature and humidity. If the specimen elongates no less than 25 percent or failure initiates outside the joint area, the procedure qualifies for use.

(b) *Mechanical Joints.* Before any written procedure established under §192.273(b) is used for making mechanical plastic pipe joints that are designed to withstand tensile forces, the procedure must be qualified by subjecting five specimen joints, made according to the procedure to the following tensile test:

(1) Use an apparatus for the test as specified in ASTM D638-77a (except for conditioning).

(2) The specimen must be such length that the distance between the grips of the apparatus and the end of the stiffener does not affect the joint strength.

(3) The speed of testing is 5.0 mm (0.20 in) per minute, plus or minus 25 percent.

(4) Pipe specimens less than 102 mm (4 in) in diameter are qualified if the pipe yields to an elongation of no less than 25 percent or failure initiates outside the joint area.

(5) Pipe specimens 102 mm (4 in) and larger in diameter shall be pulled until the pipe is subjected to a tensile stress equal to or greater than the maximum thermal stress that would be produced by a temperature change of 55°C (100°F) or until the pipe is pulled from the fitting. If the pipe pulls from the fitting, the lowest value of the five test results or the manufacturer's rating, whichever is lower must be used in the design calculations for stress.

(6) Each specimen that fails at the grips must be retested using new pipe.

(7) Results obtained pertain only to the specific outside diameter, and material of the pipe tested, except that testing of a heavier wall pipe may be used to qualify pipe of the same material but with a lesser wall thickness.

(c) A copy of each written procedure being used for joining plastic pipe must be available to the persons making and inspecting joints.

(d) Pipe or fittings manufactured before July 1, 1980, may be used in accordance with procedures that the manufacturer certifies will produce a joint as strong as the pipe.

[Amdt. 192-34A, 45 FR 9935, Feb. 14, 1980, as amended by Amdt. 192-34B, 46 FR 39, Jan. 2, 1981; 47 FR 32720, July 29, 1982; 47 FR 49973, Nov. 4, 1982]

§192.285 Plastic Pipe; Qualifying Persons to Make Joints

(a) No person may make a plastic pipe joint unless that person has been qualified under the applicable joining procedure by:

(1) Appropriate training or experience in the use of the procedure; and

(2) Making a specimen joint from pipe sections joined according to the procedure that passes the inspection and test set forth in paragraph (b) of this section.

(b) The specimen joint must be:

(1) Visually examined during and after assembly or joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure; and

(2) In the case of heat fusion, solvent cement, or adhesive joint:

(i) Tested under any one of the test methods listed under §192.283(a) applicable to the type of joint and material being tested;

(ii) Examined by ultrasonic inspection and found not to contain flaws that would cause failure; or

(iii) Cut into at least three longitudinal straps, each of which is:

(A) Visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area; and

(B) Deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

(c) A person must be requalified under an applicable procedure, if during any 12-month period that person:

(1) Does not make any joints under that procedure; or

(2) Has three joints or three percent of the joints made, whichever is greater, under that procedure that are found unacceptable by testing under §192.513.

(d) Each operator shall establish a method to determine that each person making joints in plastic pipelines in his system is qualified in accordance with this section.

[Amdt. 192-34A, 45 FR 9935, Feb. 14, 1980, as amended by Amdt. 192-34B, 46 FR 39, Jan. 2, 1981]

§192.287 Plastic Pipe; Inspection of Joints

No person may carry out the inspection of joints in plastic pipes required by §§192.273(c) and 192.285(b) unless that person has been qualified by appropriate training or experience in evaluating the acceptability of plastic pipe joints made under the applicable joining procedure.

[Amdt. 192-34, 44 FR 42974, July 23, 1979]

§192.513 Test Requirements for Plastic Pipelines

(a) Each segment of a plastic pipeline must be tested in accordance with this section.

(b) The test procedure must insure discovery of all potentially hazardous leaks in the segment being tested.

(c) The test pressure must be at least 150 percent of the maximum operating pressure or 50 psig, whichever is greater. However, the maximum test pressure may not be more than two times the design pressure of the pipe.

(d) The temperature of thermoplastic material must not be more than 100°F during the test.

Note:

Title 49 CFR §192.285 has been amended and along with §192.287 has an effective date of April 1, 1988. Title 49 CFR §192.512 is also quoted and is presently effective.