Municipal Advisory Board

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MAB Guidelines for Fusing HDPE Pipe in Cold and Inclement Weather

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FOREWORD. This guide was developed by the Municipal Advisory Board (MAB) and published with the help of the members of the Plastics Pipe Institute, Inc. (PPI).

This publication is intended as a guide for engineers, users, contractors, code officials, and other interested parties for use in the design, construction and installation of high-density polyethylene (HDPE) pressure water piping systems. The local utility or engineer may need to modify this guide to adapt the document to local conditions, operations, and practices.

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The MAB serves as an independent, non-commercial adviser to the Municipal & Industrial (M & I) Division of the PPI. Once adopted, MAB will consider revising this guide from time to time, in response to comments and suggestions from the users. Please send suggestions of improvements to Camille George Rubeiz, PE, F. ASCE, at crubeiz@plasticpipe.org.

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MAB-08: MAB Guidelines for Fusing HDPE Pipe in Cold and Inclement Weather

In cold weather (any temperature below 0°C (32°F) and before proceeding with the F2620 fusion procedure, the local temperature shall be raised as shown below in the UK reference.

During cold weather and/or inclement weather (snow, rain, wind conditions) the fusion operation must be shielded to keep precipitation from the work zone and to prevent excessive heat loss from wind chill.

ASTM F2620 states in Appendix A1 Cold weather procedures: Butt, Saddle or Socket fusion joining is generally not recommended below -4°F (-20°C) without special provisions such as a portable shelter or trailer or other suitable protective measures with auxiliary heating. The UK Water Industry Standard, WIS 4-32-08 (water.org.uk), includes in Sec. 4.6a the following requirements for butt fusion at very low ambient temperatures: "Where butt fusion jointing is conducted at ambient temperatures below 0°C [32°F], a space heater shall be provided for the shelter to raise the local temperature above 0°C [32°F], preferably above 5°C [40°F] to prevent icing of the machine chassis and thickening of hydraulic control fluids". In extreme cold use hydraulic fluids that are appropriate for the temperature. Consult the fusion equipment manufacturer for guidance about the appropriate way to warm the equipment before starting the fusion of the pipe.

Practical measures must be taken to raise temperature of the pipe ends and protect the fusion work zone during cold and inclement weather. The size of the pipe to be fused and the amount of pipe end heating required will determine which of these measures are appropriate.

Reels and/or stick pipes can be tented with tarps and supplied with warm air from an indirect fired heater.

Per ASTM F2620 (A1.5.2.2): "Colder temperatures require a longer heating time to develop an indication of melt and the final bead size. The pipe wall thickness and pipe diameter are primary factors to consider when determining the necessary heating time." Also, per ASTM F2620 (A.1.5.6) "The specified heating plate temperature range shall not be exceeded [or reduced] to accommodate cold weather conditions." The temperature range shown in F2620 [400 to 450°F (204 to 232°C) for butt fusion] shall not be altered.

Example Procedure:

1. Remove snow, ice and melted ice from stored pipe.

2. Don't drop pipe in freezing conditions since HDPE pipe has reduced impact resistance at freezing temperatures. Dropped pipe shall be labelled, removed and examined for suitability of use.

3. Construct an adequate enclosure with space heaters to protect both ends of the pipe and the fusion equipment from the elements. The enclosure may consist of heating blankets draped over the pipe ends, a tent enclosing the fusing equipment and both pipes or in extreme cold and windy conditions a temporary insulated structure should be considered. Ambient temperatures within the enclosure should be above 5°C (40°F). Avoid applying excessive heat [max. 120°F (50°C)] directly onto the pipe surface.

4. Plug or cap the opposite ends of the pipe to reduce wind chilling in the bore of the pipe. Even a garbage bag taped to the pipe end can significantly reduce airflow.

5. Ensure that the clamps and the pipe to be clamped are dry and free of ice and snow. Also, ensure that the grooves on the clamps are not plugged with ice or frozen mud/dirt.

6. Ensure that the pipe ID and OD are clear of moisture for sufficient length to prevent moisture at the heater face.

7. Shield the fusion area by means of an equipment shelter that is large enough to accommodate the machine and operator and allow full mobility of equipment and operator.

8. Use portable space heaters (electric, propane or other fuel sourced Salamanders) to heat the work zone to raise the local temperature above 32°F (0°C) and preferably above 40°F (5°C). Indirect fired heaters are often specified. Follow OSHA guidelines when using gas heaters in a confined space. Direct fired heaters may be prohibited in confined space.

9. Preheat the pipe by bringing the HDPE pipe faces to be joined to a distance of approximately ¼"- ½" away from the heater surface to raise the pipe temperature. This preheat time will vary based on ambient temperature, and wall thickness.

10. Keep the heating tool in an insulated container between fusions. Do not increase the heating tool temperature above the specified setting.