



Designation: D8468 – 23

Standard Practice for Data Recording Procedure for Welding Devices Used to Produce Thermal Fusion Welds in Geomembrane Systems¹

This standard is issued under the fixed designation D8468; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice establishes the minimum required data recording, saving, and reporting requirements for data acquisition devices used in thermal fusion welding of geomembrane systems. Thermal fusion welding devices may include hot-wedge or hot-air wedge welders. From the data collected using this practice, it is possible to compare the welding parameters used on any production weld to those obtained during the trial welding and to the set welding parameters. This practice does not purport to identify the quality of any given weld. This standard can be used for all geomembranes, homogeneous or scrim reinforced, that can be seamed by thermal fusion welding methods.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 Definitions:

2.1.1 *construction quality assurance (CQA)*—a planned system of activities that provides the owner and permitting agency assurance that the facility was constructed as specified in the design.

2.1.2 *construction quality control (CQC)*—a planned system of inspections that is used to directly monitor and ensure that a minimum standard of materials and workmanship is used to ensure the performance of the facility according to the design.

2.1.3 *data recording device (“device”)*—an instrument that obtains and stores information.

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3. Summary of Practice

3.1 This practice specifies data acquisition capabilities for the purpose of recording the welding parameters used in any location along the entire length of a weld. The recording of the welding parameters allows for real-time monitoring as well as post-production seam analysis comparison to the trial welds carried out.

3.2 The data recorded can be used for construction quality control, construction quality assurance, and other metrics.

4. Significance and Use

4.1 Standard wedge welding devices rely on the operator to properly adjust the welding parameters (temperature, speed, and pressure) which are needed to create a sound weld. Changes in one or more of these parameters during production seaming, whether deliberate or accidental, can lead to poor weld quality. Prior to data acquisition systems, verifying welding parameters throughout the welding process relied solely on periodic visual observations and documentation, leaving substantial room for error. This ASTM standard practice, which requires a data acquisition system to be installed on thermal fusion welding devices, allows for the recording of these welding parameters along the entire length of the welded seam at pre-determined intervals, throughout the entire thermal fusion seaming process.

4.2 The acquired data can be used in the construction quality control / construction quality assurance program to compare the welding parameters at recorded locations along the welded length to preset values, such as the values obtained during the trial seam, to facilitate detection of anomalies anywhere on the welded length.

4.3 This practice does not cover the precision of the measurement, that is, the accuracy of the recorded values of temperature, speed, pressure, or position on the site. It is limited to the data acquisition process.

4.4 Data acquisition parameters, such as the frequency at which the data are recorded, may be adjusted by the user depending on project specifications.

5. Apparatus—General Requirements

5.1 Data Recording Device:

5.1.1 The device shall be able to record information pertaining specifically to the thermal fusion welded seam being produced. The following is the minimum data required to be recorded:

- 5.1.1.1 Hot wedge or hot air wedge temperature.
- 5.1.1.2 Automatic date/time stamp for each data set.
- 5.1.1.3 Device travel speed.
- 5.1.1.4 Welding pressure.
- 5.1.1.5 Date and time the weld started and ended.
- 5.1.1.6 Weld length.
- 5.1.1.7 Data recording interval.
- 5.1.1.8 Device distance from weld start at each collection point.
- 5.1.1.9 Preset temperature min. and max. or $\pm$ tolerance.
- 5.1.1.10 Preset speed min. and max. or $\pm$ tolerance.
- 5.1.1.11 Preset pressure min. and max. or $\pm$ tolerance.
- 5.1.2 The device may include the ability to record GPS coordinates for the purpose of site verification or other uses, as necessary.

5.1.3 The device shall be able to operate accurately under the ambient conditions for which it is designed. The device accuracy documentation shall be supplied by the manufacturer or distributor.

5.1.4 Calibration requirements shall be followed as per the manufacturer's recommendations and documentation supplied accordingly.

5.1.5 The recorded welding data in the device shall not be subject to modification of any kind.

5.1.6 The recorded welding data in the device must be downloadable to a personal computer, tablet, or smartphone so that it may be processed, shared, or stored depending upon the requirements. This information shall then be available in a graph/table format or both depending upon which combination is most suitable for the welding data being portrayed.

5.1.7 The device shall have sufficient storage capacity to be able to record and store sufficient welding data between downloading to ensure that data is not overwritten before it has been saved to an external device.

5.2 Software:

5.2.1 A mobile device app, software, or combination thereof with the capacity to communicate with the data recording device must be available.

6. Training

6.1 The user must be trained in the use of the device's data recording system.

7. Procedure

7.1 Set up the data recording system on the device as per the manufacturer's operating instructions.

7.2 Verify that the device manufacturer or distributor has confirmed the accuracy of the welding parameter sensors on the device.

7.3 Ensure that there is enough storage space to acquire new data and/or that wireless data acquisition systems are operational. To ensure data preservation, it should be downloaded at regular intervals.

7.4 Select the data recording interval as required in the project specifications.

7.5 If the data recorder is not automatically started/stopped when the nip pressure rollers are engaged/disengaged for welding, start the data recorder as soon as the welding process begins and stop the data recorder as soon as the welding process stops during the entire thermal fusion seaming process, including production seams and trial seams.

8. Report

8.1 Welding data records shall be created and saved. These records may come entirely from the welding data recorder on each device, or a combination of the data from each device and post-processing of the data to yield a final welding record. The documented information must include at least the following:

8.1.1 Recorded Data from Each Welding Device:

8.1.1.1 Temperature (device): actual and set.

8.1.1.2 Speed (device): actual and set.

8.1.1.3 Pressure (device): actual and set.

8.1.1.4 Date and time each weld started and ended.

8.1.1.5 Weld length of each weld.

8.1.1.6 Data recording interval.

8.1.1.7 The temperature, speed, and pressure should be displayed in a graph or table format or both, without the ability to manipulate the data once it is recorded.

8.1.2 Additional Required Report Data—Depending on data recording device capabilities, the following required data should be added to the report post-recording if capabilities do not allow the data to be added prior to welding:

8.1.2.1 Project name and location.

8.1.2.2 Installation company.

8.1.2.3 Welding device operator.

8.1.2.4 Welding device serial number.

8.1.2.5 Data recording device serial number if different than welding device.

8.2 Additional information may be added to the welding report as required by individual projects:

8.2.1 Geomembrane details (manufacturer/supplier, polymer type, thickness, surface).

8.2.2 GPS coordinates.

8.2.3 Voltage.

8.2.4 Notes, photographs, or both may be added to support or clarify the recorded information.