

**AWS G1.10M: 2016**  
**An American National Standard**

# **Guide for the Evaluation of Thermoplastic Welds**



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**An American National Standard**

**Approved by**  
**American National Standards Institute**  
**April 21, 2016**

# **Guide for the Evaluation of Thermoplastic Welds**

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Prepared by the  
American Welding Society (AWS) G1 Committee on Joining of Plastics and Composites

Under the Direction of the  
AWS Technical Activities Committee

Approved by  
AWS Board of Directors

## **Abstract**

This standard lists and describes flaws and defects in hot gas, hot gas extrusion, heated tool butt fusion, socket fusion, electrofusion, and flow fusion welded joints in thermoplastics. Its intent is to make possible a generally valid evaluation giving consideration to graded quality requirements. This standard encompasses the classification, requirements, testing, evaluation, and acceptance of the welds. Details in recording engineering data are described. Tables illustrating cracks, voids, solid inclusions, lack of fusion, flaws and defects of shape, and other flaws and defects in thermoplastic welds are included. Flaw and defect features with descriptions and illustrations are compiled into tables to aid in the evaluation of welds.



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## Foreword

This foreword is not part of this standard but is included for informational purposes only.

The purpose of plastics welding inspection is to determine if a plastics weldment meets the acceptance criteria of a specific code, other standard, or other document. The plastics welding inspector must be thoroughly familiar with plastics welding processes, plastics welding procedures, plastics welder qualifications, materials, the limitation of plastics weld testing, be able to read drawings, prepare and keep records, prepare and make reports and make responsible judgments. For plastics welding inspectors to be effective, the activities performed should be consistent with the requirements, and technical and ethical principles.

The AWS G1 Committee on Joining Plastics and Composites was formed in 1989 by industry and academic experts interested in providing process information and test standards for rating the weldability of plastic and composite materials. The G1A Subcommittee on Hot Gas Welding and Extrusion Welding was formed in 1993 to create standards for the qualification of hot gas and heated tool plastic welding personnel. DVS 2202-1, Imperfections in thermoplastic welding joints; features, descriptions, evaluation, was used extensively in the creation of this standard.

This is the second edition of this specification. The title of the document was changed and editorial changes were made to the Scope (Clause 1). Weld flaws and defects for socket fusion, electrofusion, and flow fusion are new to this edition.

## *SUGGESTIONS*

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, G1 Committee on Joining of Plastics and Composites, American Welding Society, 8669 NW 36 Street #130, Miami, FL 33166.

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# Guide for the Evaluation of Thermoplastic Welds

## 1. Scope, Purpose, and Range of Application

**1.1** These guidelines list and describe defects and flaws in welded joints in thermoplastic materials. The objective is to make possible a generally valid evaluation giving consideration to graded quality requirements. This guide is meant to aid those responsible for the evaluation of thermoplastic welds. The final determination of what is an acceptable weld should be the responsibility of the engineer, owner or user.

**1.2** By classification into one of the evaluation groups in 4.1, specific flaws may be excluded or kept within limits when welded joints are produced.

**1.3** The application of these guidelines and the measures through which they can be met should be included in contractual specification or form part of the generally recognized specifications.

**1.4 Welding Processes.** Defects and flaws produced by the following welding processes are addressed. This guide applies to the following processes:

	<u>Abbreviation</u>	<u>Annex</u>
Hot Gas Welding	(HGW)	
Fan Welding	(HF)	G
Speed Welding	(HS)	G
Extrusion Welding	(EX)	H
Heated Tool Butt Fusion Welding	(HT)	I
Socket Fusion Welding	(SFW)	J
Electrofusion Welding	(EFW)	K
Flow Fusion Welding	(FFW)	L

**1.5 Materials.** These guidelines apply to welded joints on components and systems made from the engineering thermoplastics listed below:

**Table 1.1**  
**Base Materials**

<u>Abbreviation</u>	<u>Name</u>
PVC	Polyvinyl Chloride
CPVC	Chlorinated Polyvinylchloride
PP	Polypropylene
PE	Polyethylene
PVDF	Polyvinylidene Fluoride
ECTFE	Ethylene Chlorotrifluoroethylene
ETFE	Ethylene Tetrafluoroethylene
FEP	Perfluoro (ethylene propylene)
PFA	Perfluoroalkoxy
ABS	Acrylonitrile-Butadiene-Styrene