



CGA E-1—2022 STANDARD FOR RUBBER WELDING HOSE AND HOSE CONNECTIONS FOR GAS WELDING, CUTTING, AND ALLIED PROCESSES

EIGHTH EDITION

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NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendix A (Informative) is for information only.

NOTE—Appendix B (Normative) is a requirement.

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1 Introduction

Specifications describing hose connections for welding and cutting equipment were formulated and adopted in 1925 by the International Acetylene Association (IAA), the Gas Products Association, and various manufacturers. Similar specifications were adopted by the National Screw Thread Commission in 1926. Revised specifications were adopted by the IAA in 1939 and amended in 1953 and 1954. Until 1954, the specifications dealt with connections for oxygen and fuel gases for welding and cutting. With the advent of inert gases used for blanketing (to prevent oxidation) and water used for cooling in inert gas metal arc welding processes, significant additions to the specifications were adopted by IAA in 1957. In 1962 the IAA ceased to exist, and its activities were taken over by the Compressed Gas Association, Inc. (CGA). IAA specifications were revised in accordance with similar CGA standards. In this standard, each connection size and style is presented on a separate page with the right-hand and left-hand connections shown on the same page with a single drawing.

It should be noted that Connection No. 022 for oxygen is similar to Connection No. 1240 in CGA V-5, *Standard for Diameter Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications)* [1].¹ Dimensions and other information on hose connections for welding and cutting equipment are found in FED-STD-H28, *Screw-Thread Standards for Federal Services*, Section 11, "Hose Connections for Welding and Cutting Equipment" [2].

For years, CGA jointly issued a rubber welding hose standard, ARPM IP7, *Specifications for Rubber Welding Hose*, with the Association for Rubber Products Manufacturers (ARPM) [3]. CGA became aware that incidents can occur if the wrong grade of hose was selected for the particular gas being used. Therefore, in 2004, CGA recommended the exclusive use of Grade T hose in CGA SB-11, *Use of Rubber Welding Hose* since Grade T hose eliminates the gas compatibility, oil resistance, and flammability issues.

NOTE—CGA SB-11, *Use of Rubber Welding Hose*, was incorporated into the seventh edition of CGA E-1 as an informative appendix, see Appendix A.

2 Scope

This standard provides specifications for multi-service rubber hose used for welding, cutting, and allied processes. This standard also describes connections for regulator outlets, torches, and fitted hose for welding and cutting equipment. It provides the dimensions of components (threaded connector, tailpiece, and coupling nut) for 18 different connections (Connection No. 020 through Connection No. 037) that can be used to connect gas hoses with torches and regulator outlets.

To promote safety and reliability in service, the performance requirements that shall be met by the completed assemblies at the time of manufacture or rebuilding are specified.

This standard does not apply to liquefied petroleum (LP) gas hose covered under National Fire Protection Association (NFPA) 58, *Liquefied Petroleum Gas Code* applicable to the propane industry [4].

This standard describes the performance requirements of the hose that is fitted on the tailpiece with a clamp or ferrule.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

4 Connections

Hose fitting connections consist mainly of a connector, a nut, a tailpiece, and a clamp or ferrule. The connectors, nuts, and tailpieces suitable for use in fitted hose assemblies shall conform to the dimensions shown in Connection No. 020 through Connection No. 037. Alternatively, connections conforming to ISO/TR 22821, Gas welding equipment - Hose connections for equipment for welding, cutting and allied processes - Listing of connections which are either standardised or in common use may be used [5]. When assembled with a clamp or ferrule, the assembly shall meet the specifications of 7.1 and 7.2.

4.1 Materials

Unless specified, materials are not covered by this standard. The chemical and physical properties of the gases shall be considered to determine suitability of materials.

4.2 Connectors

Modified connectors incorporating soft tips or O-rings to permit hand-tight connections, check valves, etc., are considered in compliance. Connectors that incorporate pipe threads, socket joints, etc., on the shank end are acceptable.

This standard does not cover nor preclude the manufacture of connectors having flow passages (Dimension C in Connection No. 020 through Connection No. 037) modified to incorporate filters, check valves, restrictions, or other features for special applications.

4.3 Nuts

Nuts modified to permit hand-tight connections are considered in compliance.

4.4 Tailpieces

The tailpiece details such as length, outside diameter, and configurations on the shank are optional.

Modified tailpieces incorporating soft tips or O-rings to permit hand-tight connections are considered in compliance. Tailpieces that incorporate pipe threads, socket joints, etc., on the shank end are acceptable.

This standard does not cover nor preclude the manufacture of connectors and tailpieces having flow passages (Dimension E in Connection No. 020 through Connection No. 037) modified to incorporate filters, check valves, restrictions, or other features for special applications.

Examples of tailpiece configurations are shown in Figure 1.

4.5 Clamps or Ferrules

The clamp or ferrule shall be of the type that is nonadjustable and nonremovable. Spiral screw type hose clamps are not permitted.

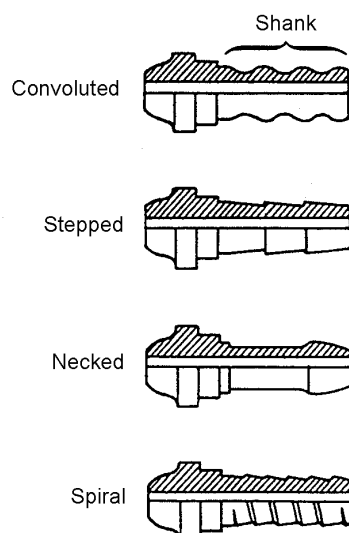


Figure 1—Examples of tailpiece configurations

5 Hose

5.1 Materials and construction

Materials used in the fabrication of welding, cutting, and allied process hose shall be resistant to the mechanical, chemical, and thermal effects of the gases and the environment to which they will be exposed under operating conditions.

Welding hose shall be suitable for use with oxygen and any of the flammable compressed gases in common use in welding, cutting, and allied processes. This includes acetylene, hydrogen, methylacetylene propadiene stabilized (MPS), natural gas, propane, propylene, as well as proprietary mixtures sold under various trade names.

The materials, construction, and properties of the hose tube, reinforcement, and cover shall meet the requirements for grade T specified in ARPM IP7, or meet the requirements of the “all fuel gas hose” category of ISO 3821, *Gas welding equipment—Rubber hoses for welding, cutting, and allied processes* [3, 6].

The hose shall be designed and manufactured with a minimum burst pressure of 800 psi (5520 kPa).²

5.2 Hose grade

The hose grade for oxy-fuel gas applications shall be CGA E-1 Grade T, which is equivalent to ARPM IP7 Grade T [3].

5.3 Hose types

The types and sizes of CGA E-1 hose (example; standard duty, single line, double line, etc.) of rubber hose used in welding, cutting, and allied processes shall be in accordance with ARPM IP7 with a maximum allowable working pressure (MAWP) of 200 psi (1380 kPa) [3].

5.4 Hose sizes

The sizes of rubber hose used in welding, cutting, and allied processes shall be in accordance with Table 1.

² psi, bar, and kPa shall indicate gauge pressure unless otherwise noted as (psia; bar, abs; and kPa, abs) for absolute pressure or (psid; bar, dif; and kPa, dif) for differential pressure. All kPa values are rounded off per CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry* [7].

Table 1—Inside diameter (ID) hose sizes and tolerances

Nominal hose size (ID)	Tolerance (in)
CGA E-1	
1/8 in	0.102 – 0.148
3/16 in	0.165 – 0.211
1/4 in	0.227 – 0.273
5/16 in	0.289 – 0.335
3/8 in	0.352 – 0.398
1/2 in	0.469 – 0.531
3/4 in	0.724 – 0.781
ISO 3821	
4 mm	0.138 – 0.180
5 mm	0.175 – 0.219
6.3 mm	0.226 – 0.270
8 mm	0.289 – 0.341
10 mm	0.368 – 0.420
12.5 mm	0.468 – 0.476
20 mm	0.764 – 0.811

5.5 Hose tube and cover

The inner tube and outer cover shall be both oil resistant and flame resistant. Welding hose may be of various types of construction consisting of different numbers of braids or plies provided it meets the physical and performance requirements specified in Section 6.

5.6 Hose color

Hose color shall be in accordance with Table 2.

Table 2—Hose color code

Gas service	CGA E-1 color	ISO 3821 color
Oxygen	Green	Blue
Fuel Gases	Red	Red/Orange
Compressed Air, Nitrogen, Argon, Helium, Carbon Dioxide	Black	Black

5.7 Hose marking

Hose shall be continuously marked at maximum intervals of 36 in (910 mm). Hose markings shall include:

- name, trademark or ARPM assigned manufacturers code of the manufacturer;
- date of manufacture (open date code);
- maximum allowable working pressure 200 psi (1380 kPa);
- nominal hose inside diameter (ID); and
- CGA E-1 Grade T.

6 Fitted hose assembly

A fitted hose assembly is a length of hose with fittings added. The physical strength and resultant safety of the fitted hose assembly can be considerably less than that of the hose and fittings when separate components