NEMA EW 6

GUIDELINES FOR PRECAUTIONARY LABELING OF ARC-WELDING AND CUTTING PRODUCTS

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NEMA Standards Publication EW 6-2006

Guidelines for Precautionary Labeling of Arc-Welding and Cutting Products

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FOREWORD

In arc welding and cutting, as in other jobs, there is a risk of exposure to certain hazards. Manufacturers and suppliers of arc welding and cutting products need to determine these hazards and create appropriate precautionary labels that quickly remind and alert product users of hazards each time the product is used. In addition to precautionary labels, product users must also draw upon their experience, training, education, common sense, and other sources of information to recognize and avoid hazards.

This NEMA Standards Publication provides precautionary labeling guidelines for manufacturers and suppliers to assist them in the preparation of their precautionary labels for arc welding and cutting products. Development of this publication first began in 1979, leading to publication in 1983. The purpose of the publication was, and remains, to promote label consistency by providing general principles regarding the design and type of information to be included in precautionary labels for arc welding and cutting products, and the format of those labels. These general principles include the use of the safety alert symbol, signal words, a statement of hazards and their consequences, a statement of precautions to be taken, and any additional information the manufacturer or supplier deemed appropriate. The general principles in the 1983 edition anticipated the work of the ANSI Z535 Committee on Safety Signs and Labels, which also began its work in 1979, but did not publish its standard incorporating similar principles until 1991. Since 1983, new editions of this publication have incorporated developments in the ANSI Z535 series of standards, other domestic and international standards, as well as other informative information.

The 1994 edition took 38 hazard alerting symbols from other standards and authoritative sources, and standardized them for optional use on precautionary labels or instructions. The 38 hazard alerting symbols were selected to show basic arc welding process or equipment hazards in the context of the welding environment. Some of the symbols were revised to better illustrate hazard avoidance while retaining clear identification of the basic hazard. The 1994 edition also included color and size recommendations for these symbols, as well as guidelines for the precautionary labeling of plasma arc cutting equipment. The selected symbols were distributed to a broad, sizeable target audience and were tested according to ANSI Z535 methods for comprehension. Although a comprehension rate of 85% was established by ANSI Z535.3, the results of nearly all symbols tested were significantly in excess of that figure, with most in the range of 95-100%. Where comprehension rates were lower, the symbols were modified and the revised symbols were retested and validated.

The 1998 edition introduced wordless labels, which are an extension of the symbols introduced in the 1994 edition. These wordless labels were developed in recognition of an increasingly diverse international welding and cutting audience. It cannot be assumed that this audience can read the language used in a label. Wordless (symbols-only) labels avoid the need to be able to read the words on the label. Where symbols are well recognized, language and literacy level can become non-factors in communication. Wordless label elements were tested and validated in the same manner as the symbols were for the 1994 edition, but with an increased emphasis on the international audience.

This 2005 edition adds examples of multi-language precautionary labels. Further, this edition was prepared taking into account NEMA-acceptable drafting principles for ISO/IEC standards. Lastly, this edition considered both ISO 17846 standard, as well as the latest editions of ISO 3864 and ANSI Z535.

User needs were considered throughout the development of this publication. As revisions are made to this document, NEMA intends to continue to involve users in these changes through surveys or other means. Recommendations for any revisions to EW 6 should be submitted to:

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This Standards Publication was approved by the NEMA Arc Welding Section. However, Section approval of this standard does not imply that all Section members voted for its approval or participated in its development. At the time this standard was approved, the Arc Welding Section consisted of the following members:

ESAB Welding & Cutting Products - Florence, SC / Hanover, PA
Hypertherm Inc. - Hanover, NH
The Lincoln Electric Company - Cleveland, OH
Miller Electric Manufacturing Company - Appleton, WI
Systematics - West Chester, PA

The artwork for the graphic symbols and wordless labels (see clauses 6 and 7, respectively) is stored in electronic files at NEMA. Users who wish to obtain this artwork can download these files, which are accessible from the NEMA Arc Welding Section's web page at http://forums.nema.org:443/~1ew.

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1 Scope

This publication provides guidelines for the content, format, and placement of text-only, text-and-symbols, symbols-only, and multi-language precautionary labels for arc welding and cutting products.

2 References

The documents listed below are either referred to elsewhere in this publication or can be helpful references in the design of precautionary labels. Each document has a corresponding footnote identifying the publisher and providing document ordering information, where available. It is recommended that the latest edition be requested when ordering.

ANSI 49.1, *Safety in Welding, Cutting and Allied Processes*[1]

ANSI Z129.1, *American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals*[2]

ANSI Z535.1, *Safety Color Code*[2]

ANSI Z535.2, *Environment and Facility Safety Signs*[2]

ANSI Z535.3, *Criteria for Safety Symbols*[2]

ANSI Z535.4, *Product Safety Signs and Labels*[2]

ANSI Z535.5, *Safety Tags and Barricade Tapes (for Temporary Hazards)*[2]

CSA C22.2 No. 60, *Arc Welding Equipment*[3]

DIN 30 600, *Graphic Symbols (Bildzeichen Übersicht)*[4]

EW 4, *Graphic Symbols for Arc Welding Apparatus*[5]

FMC, *Product Safety Sign and Label System*[6]

IEC 60417, *Graphic symbols for use on equipment — Index, survey and compilation of the single sheets*[7]

IEC 60974-1, *Arc welding equipment — Part 1: Welding power sources*[7]

———————

1 Published by, and available from, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126, phone 1-800-443-9353; also available via free download from www.aws.org

2 Published by, and available from, American National Standards Institute, 11 West 42nd Street, New York, NY 10036; website: www.ansi.org; phone: 1-212-642-4980

3 Published by, and available from, Canadian Standards Association, 5060 Spectrum Way, Mississauga, Ontario L4W 5N6, Canada; website: www.csa.ca; phone: 1-800-463-6727

4 Published by Deutsche Institut für Normung and available from Beuth Verlag GmbH, Burggrafenstraße 6, Berlin, Germany; website: www.beuth.de

5 Published by National Electrical Manufacturers Association and available from Global Engineering Documents; website: global.ihs.com; phone: 1-877-413-5184

6 Published by FMC Corporation, Corporate Technology Center, P.O. Box 580, Santa Clara, CA 95052

7 Published by, and available from, International Electrotechnical Commission, 3 rue de Varembé, Geneva 1120, Switzerland; website: www.iec.ch

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ISO 3864-1*, Graphical symbols — Safety colours and safety signs — Design principles for safety signs in workplaces and public areas*[8]

ISO 3864-2, *Graphical symbols — Safety colours and safety signs — Design principles for product safety labels*[8]

ISO 7000, *Graphical symbols for use on equipment*[8]

ISO 17846, *Wordless precautionary labels for equipment and consumables used in arc welding and cutting*[8]

MB 3699, *Product Safety Label Handbook*[9]

UL 551, *Transformer-type Arc Welding Machines*[10]

UL 2201, *Portable Engine-Generator Assemblies*[10]

3 Terms and definitions

3.1
precautionary label
label affixed to a product that provides safety information about that product

NOTE The precautionary label identifies, in order, the degree or level of hazard seriousness, the hazard, the probable consequence of involvement with the hazard, and how the hazard can be avoided. The precautionary label can also provide additional information. A precautionary label may take a form other than a label, such as a tag, decal, or nameplate imprint.

4 Guidelines for precautionary labels

4.1 Types

Precautionary labels for use in arc welding and cutting may use text only, a combination of text and symbols, or symbols only. Specific guidelines for text-only labels are provided in clause 5. Specific guidelines for text-and-symbols labels, including multi-language labels, are provided in clause 6. Specific guidelines for symbols-only (i.e. wordless) labels are provided in clause 7.

4.2 General

4.2.1 Consistency

The effectiveness of a precautionary label can be improved by consistency of wording and symbols. A chief consideration is understandability by the users. Therefore, any wording or symbols used should be as consistent, brief, and clear as possible.

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8 Published by, and available from, International Organization for Standardization, 1 rue de Varembé, Geneva 1120, Switzerland; website: www.iso.ch

9 Published by Westinghouse Electric Corporation, Gateway Center, Pittsburgh, PA 15222; phone: 1-866-442-7873

10 Published by Underwriters Laboratories and available from Comm 2000; website: www.comm-2000.com; phone: 1-888-853-3503

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4.2.2 Visibility, placement, durability, size, and legibility

Precautionary labels should be highly visible and in a conspicuous place on the product or on a consumables package. Label placement should be chosen considering the available space on a product and visibility by the operator during normal use. If such space is not available, a reference note may appear in a conspicuous place identifying the location of the label.

Where possible, precautionary labels should meet existing durability requirements for labels; see CSA 22.2 No. 60, IEC 60974-1, and UL 551.

The size and legibility of a precautionary label should be such that it is easily seen, read, and understood by users with normal vision before they are likely to encounter the hazards.

NOTE If words are used on a label, translation into other languages may be required by some countries.

4.3 Elements

4.3.1 General

The following elements should be considered for a precautionary label (see also ANSI Z535.4 and ANSI Z49.1):

a) safety alert symbol;

b) color (red, orange, yellow);

c) signal word (DANGER, WARNING, CAUTION);

d) statements of hazard and their consequences;

e) precautionary measures;

f) additional information.

A precautionary label for a given product may not require all of the above elements. The included elements depend upon the product, the process, and the hazards. Regardless of elements used, a precautionary label should alert and remind the user of the basic hazards.

4.3.2 Safety alert symbol

To call attention to the hazard information, the safety alert symbol (see ANSI Z535.4, Annex A) should be used in the heading of all precautionary labels in combination with the

a) proper signal word (see 4.3.3) only,

b) color (see 4.3.3.1) only, or

c) both the proper signal word and color.

4.3.3 Signal word

4.3.3.1 General

A signal word, when used with the safety alert symbol, draws attention to the degree of a hazard or hazards. The signal word should be printed in capital letters and of a size such that it is the dominant word in the label. Where one or more signal words could be used because of multiple hazards, only the signal word corresponding to the class of greatest hazard should be used. The signal word should be preceded by the safety alert symbol.

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There are three recognized signal words as defined in ANSI Z535.4[1]: DANGER, WARNING, and CAUTION. When red, orange, and yellow are associated with DANGER, WARNING, and CAUTION respectively, the colors should conform to ANSI Z535.1.

NOTE DANGER or WARNING should not be considered for property damage accidents unless personal injury risk appropriate to these levels is also involved.

The three signal words are described in 4.3.3.2 through 4.3.3.4 in descending order of their severity.

4.3.3.2 DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury. Use of this signal word should be limited to the most extreme situations.

4.3.3.3 WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

4.3.3.4 CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury, or property damage.

4.3.4 Statement of hazards and their consequences

This statement should alert the user, in brief terms, of the specific hazard(s) and their consequences. For example,

ELECTRIC SHOCK can kill.
LOUD NOISE can damage hearing.
IMPROPER PARALLELING can damage equipment.

The hazard should be printed in capital letters and of a size such that it is the second most dominant wording in the label text. Hazard symbols shown in Table 1 may augment or replace the statement of hazard in text format. The symbols contained in the wordless labels in clause 7 may replace the statement of hazard entirely.

4.3.5 Precautionary measures

Immediately following the text statement of hazard and consequence and/or equivalent graphic symbol, understandable statement(s) should be included to describe the precaution(s) to be taken. For example, a signal word, statement of hazard and consequence, and precaution might be

WARNING
ELECTRIC SHOCK can kill.
- Do not touch live electrical parts.

Some products might qualify for other signal words and statements of hazard and precautions, such as

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1 The ANSI Z535 committee is currently revising the definitions for the signal words. NEMA will endeavor to harmonize this publication with ANSI Z535 once those revised definitions are published.

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WARNING
LOUD NOISE can damage hearing.
- Wear ear protection.

or

CAUTION
IMPROPER PARALLELING can damage equipment.
- See operating manual.

In a case where multiple hazards are present, only the signal word for the greatest hazard should be used. Nevertheless, all statements of hazard and consequence, and statements of precaution for each hazard should be included. For example,

WARNING
ELECTRIC SHOCK can kill.
- Do not touch live electrical parts.

LOUD NOISE can damage hearing.
- Wear ear protection.

IMPROPER PARALLELING can damage equipment.
- See operating manual.

Statements, as shown in this example, can apply to both the product and the process. As an alternative format to this example, all statements of hazard and consequence may be grouped together followed by all statements of precaution. For example,

WARNING
ELECTRIC SHOCK can kill.
LOUD NOISE can damage hearing.
IMPROPER PARALLELING can damage equipment.
- Do not touch live electrical parts.
- Wear ear protection.
- See operating manual.

The wordless labels shown in clause 7 include symbols that address the precautionary measures. Therefore, they do not require to be augmented by text-based statements of precaution.

4.3.6 Additional information

When complete details cannot be reasonably given on the label, sources of additional information should either be listed or the information included in the operating manual.

EXAMPLE Additional information appearing on a precautionary label:

Read ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*, available as a hard copy from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126, phone 1-800-443-9353, or as a free download from www.aws.org; OSHA Safety and Health Standards, 29 CFR 1910, available as a hardcopy from the U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401, phone 1-202-512-0000, or as a free download from www.osha.gov.

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5 Text-only precautionary labels

5.1 General

In keeping with ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes,* the labels shown in Figures 5, 6, 7, and 8 or the equivalent should, as a minimum, be placed on stock containers of materials such as wires, fluxes, and electrodes and on major equipment such as power sources, wire feeders, and controls used in arc welding, arc cutting, and allied processes. The information should be readily visible and may be on a label, nameplate, or other printed form.

In keeping with ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes,* where noise has been determined to be a hazard, the statement of hazard and consequence, "LOUD NOISE can damage hearing," should be added to Figure 1.

Additional precautionary measures may be added as needed.

First aid information is an optional item. It is recommended only for products that present immediate and major health hazards, and for which meaningful first aid information can be conveyed in a few words. Using the format of Figure 1, any first aid information should follow the last precautionary measure.

The manufacturer's name and address should appear on the precautionary label unless it is readily visible elsewhere on the product.

A label identification number should appear on the label.

WARNING: ELECTRIC SHOCK can kill. FUMES AND GASES can be hazardous to your health. SPARKS AND SPATTER can cause fire or explosion. ARC RAYS can injure eyes and burn skin.

- Do not touch live electrical parts.
- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Disconnect input power before servicing unit.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- Do not use near flammable material.
- Do not use on closed containers.
- Wear correct eye, ear, and body protection.
- Read and follow the manufacturer's instruction manual, employer's safety practices, and Material Safety Data Sheets (MSDSs).
- Only qualified persons are to install, use, or service this equipment.

Read ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*, available as a hard copy from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126, phone 1-800-443-9353, or as a free download from www.aws.org; OSHA Safety and Health Standards, 29 CFR 1910, available as a hardcopy from the U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401, phone 1-202-512-0000, or as a free download from www.osha.gov.

Do Not Remove, Destroy, or Cover This Label. 38MC

identifying number to order label from manufacturer

Figure 1 — Basic text-only precautionary label

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5.2 Engine-driven equipment

In addition to the precautionary labeling information shown in Figure 1, the information shown in Figure 2, or its equivalent, should, as a minimum, appear on engine-driven arc welding and cutting power sources. When appearing on a separate label, the appropriate signal word shall be used.

ENGINE FUEL can cause fire or explosion.
- Stop engine before fueling.
- Do not smoke when fueling.
- Avoid sparks and open flame when fueling.
- Do not overfill tank.
- Clean up spilled fuel before starting engine.

ENGINE EXHAUST can kill.
- Do not breathe engine exhaust.
- Use in open, well ventilated areas or vent engine exhaust to the outside.

MOVING PARTS can cause serious injury.
- Keep away from moving parts.
- Do not operate with protective covers, panels, or guards removed.
- Stop engine before servicing.

Figure 2 — Additional label content for engine-driven equipment

Where noise has been determined to be a hazard, the statement of hazard and consequence, “LOUD NOISE can damage hearing. Wear ear protection.” should be added to Figure 2.

When carbon monoxide is addressed, the text shown in Figure 9 should be added to Figure 2 or included as a separate label.

The wording "Use in open, well ventilated areas or vent the engine exhaust to the outside" in Figure 2 may be replaced with the alternate wording "Use unit outside or vent exhaust outside. Do not use in enclosed areas."

5.3 Electrically supplied equipment

In addition to the precautionary label information shown in Figure 1, the information shown in Figure 3 should, as a minimum, appear on electrically supplied arc welding and cutting power sources. When appearing on a separate label, the appropriate signal word shall be used along with the hazard statement "ELECTRIC SHOCK can kill."

- Install and ground machine according to all national and local codes and manufacturer’s instruction manual.
- Do not operate with protective covers, panels, or guards removed.

Figure 3 — Additional label content for electrically supplied equipment

The following wording may optionally be added to Figure 3:

- Connect cord to fused and grounded input power system.
- Use grounding terminal inside machine.

5.4 Equipment used in process variations with additional hazards

If equipment is being used in a process variation, such as plasma arc cutting, that presents additional hazards and/or avoidance measures, manufacturers shall provide a precautionary

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label with appropriate safety information in addition to that shown in Figure 1. When this additional information appears on a separate label, the appropriate signal word shall be used.

Figure 4 shows an example of additional label content for plasma arc cutting equipment.

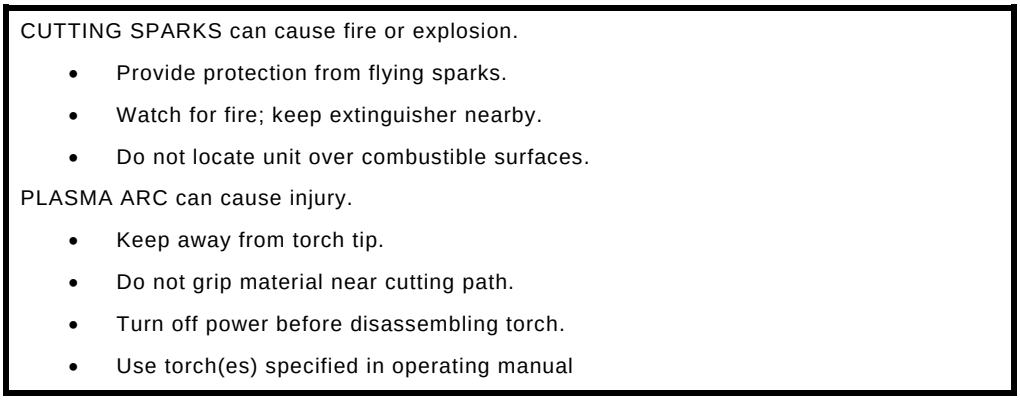

Figure 4 — Example of additional label content for plasma arc cutting equipment

Additional statements of hazard, consequences, and precautionary measures may be added as needed to Figures 1, 2, 3, and 4.

6 Text-and-symbols precautionary labels

6.1 General

In keeping with ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*, the labels shown in Figures 5, 6, 7, and 8 or the equivalent should, as a minimum and as appropriate, be placed on stock containers of materials such as wires, fluxes, and electrodes and on major equipment such as power sources, wire feeders, and controls used in arc welding, arc cutting, and allied processes. The information should be readily visible and may be on a label, nameplate, or other printed form.

Additional statements of hazard, consequences, and precautionary measures may be added as needed to the labels shown in Figures 5, 6, 7, and 8.

First aid information is an optional item. It is recommended only for products that present immediate and major health hazards, and for which meaningful first aid information can be conveyed in a few symbols and words. Using the format of Figures 5, 6, and 7, any first aid information shall follow the last precautionary measure and be clearly separated from the precautionary information as are the recommended documents to obtain and read, such as ANSI Z49.1.

The manufacturer's name and address shall appear on the label unless it is readily visible elsewhere on the product.

A label identification number shall appear on the label.

Minimum letter height in the text areas of the labels shall conform to the requirements found in ANSI Z535.4. Minimum symbol height shall conform to the requirements found in clause 6 and ANSI Z535.3.

Figures 5, 6, and 7 show examples of layouts for precautionary labels using various symbols in combination with text statements. Table 1 provides the different types of graphic symbols that may be used to identify the specific hazard.

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Horizontal formats are used for these examples since they are most common, but vertical presentations of the same symbols and text may be used as an equivalent means to present the precautionary information.

NOTE For symbols requiring a dot pattern, such as fumes, the use of a 45% gray shade is recommended.

For alternative layouts to text and symbols labels, see the latest edition of ANSI Z535.4. This ANSI standard shows many acceptable ways to combine text and symbols. In the welding and cutting industries multiple hazard labels are very common and are often used as the major general precautionary labels on major equipment and consumable containers. This publication chose to present the layouts most often used throughout the industry.

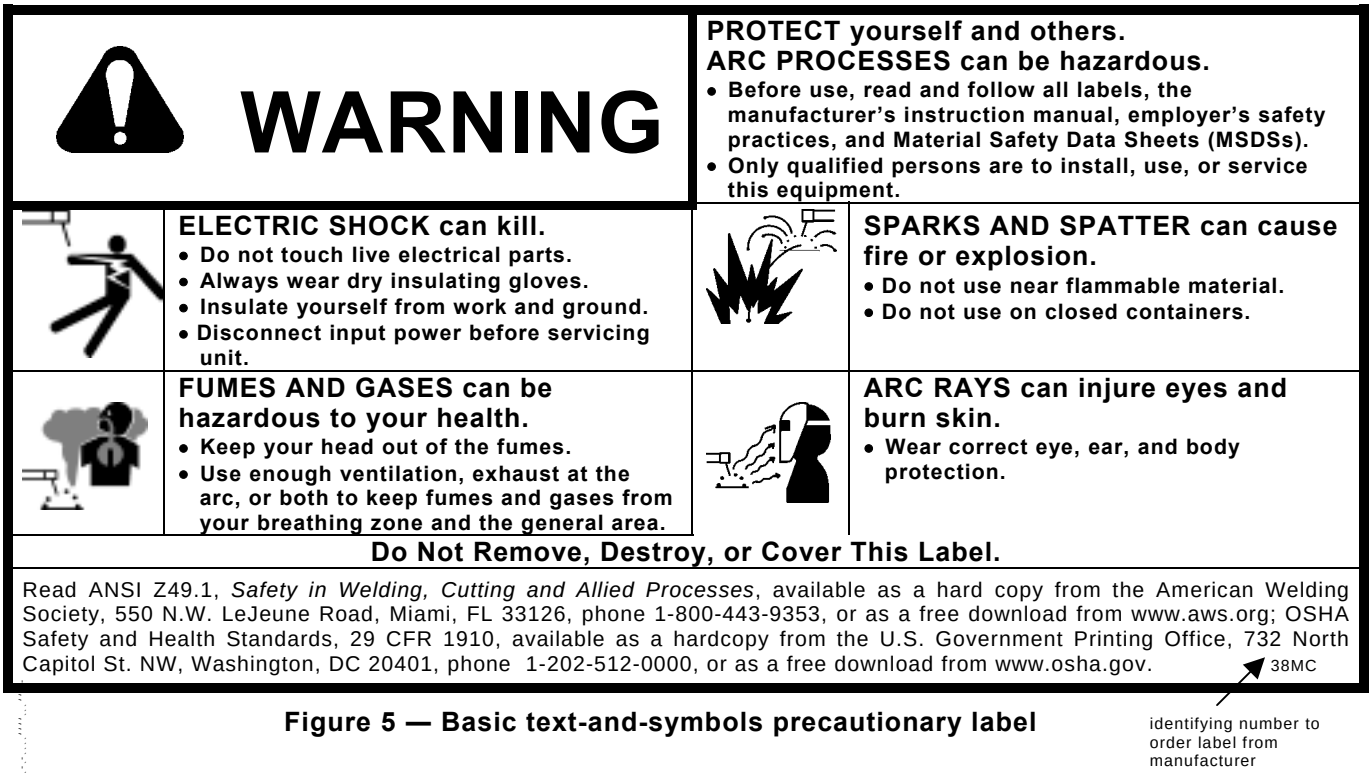

Figure 5 — Basic text-and-symbols precautionary label

Figure 5 is an example of a basic text-and-symbols precautionary label for arc welding power sources containing the information that should, as a minimum, appear on such a label. This information is parallel to that found in Figure 11.

6.2 Multiple languages

When there is a need for a multi-language text-and-symbols label, the format shown in ANSI Z535.4, Annex B, and the signal word translations shown in ANSI Z535.4, Annex D, shall be followed. An example of a multi-language label with three languages is shown in Figure 6. Additional languages may be included as needed following the same format as in Figure 6.

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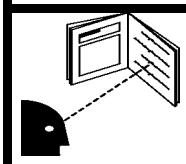
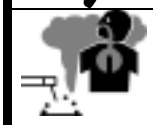
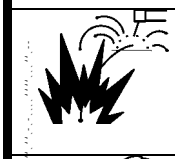
⚠ WARNING			
	**PROTECT yourself and others. ARC PROCESSES can be hazardous.** • Before use, read and follow all labels, the manufacturer's instruction manual, employer's safety practices, and Material Safety Data Sheets (MSDSs). • Only qualified persons are to install, use, or service this equipment.	**(Language 2)**	**(Language 3)**
	**ELECTRIC SHOCK can kill.** • Do not touch live electrical parts. • Always wear dry insulating gloves. • Insulate yourself from work and ground. • Disconnect input power before servicing unit.	**(Language 2)**	**(Language 3)**
	**FUMES AND GASES can be hazardous to your health.** • Keep your head out of the fumes. • Use enough ventilation, exhaust at the arc, or both to keep fumes and gases from your breathing zone and the general area.	**(Language 2)**	**(Language 3)**
	**SPARKS AND SPATTER can cause fire or explosion.** • Do not use near flammable material. • Do not use on closed containers.	**(Language 2)**	**(Language 3)**
	**ARC RAYS can injure eyes and burn skin.** • Wear correct eye, ear, and body protection.	**(Language 2)**	**(Language 3)**
Do Not Remove, Destroy, or Cover This Label / (Language 2) / (Language 3)			**38MC**

Figure 6 — Multi-language basic text-and-symbols label

identifying number to order label from manufacturer

6.3 Engine-driven equipment

Figure 7 is an example of a text-and-symbols precautionary label for engine-driven arc welding power sources containing the information that should, as a minimum, appear on such a label. This information is parallel to that found in Figure 14.

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⚠ WARNING

Do Not Remove, Destroy, or Cover This Label.



ELECTRIC SHOCK can kill.
- Do not touch live electrical parts.
- Always wear dry insulating gloves.
- Insulate yourself from work and ground.

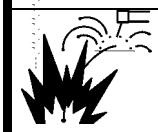
PROTECT yourself and others.
ARC PROCESSES can be hazardous.
- Before use, read and follow all labels, the manufacturer's instruction manual, employer's safety practices, and Material Safety Data Sheets (MSDSs).
- Only qualified persons are to install, use, or service this equipment.
- Stop engine before servicing unit.



FUMES AND GASES can be hazardous to your health.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the arc, or both to keep fumes and gases from your breathing zone and the general area.



ENGINE FUEL can burn or explode.
- Stop engine before fueling.
- Do not fuel while smoking or if near sparks or flames.
- Do not overfill tank; clean up any spilled fuel.



SPARKS AND SPATTER can cause fire or explosion.
- Do not use near flammable material.
- Do not use on closed containers.



ENGINE EXHAUST can kill.
- Do not breathe exhaust.
- Use unit outside or vent exhaust outside.
- Do not use near open windows.



ARC RAYS can injure eyes and burn skin.
- Wear correct eye, ear, and body protection.



MOVING PARTS can injure.
- Keep away from moving parts.
- Keep all doors, panels, covers, and guards closed and securely in place.

Read ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*, available as a hard copy from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126, phone 1-800-443-9353, or as a free download from www.aws.org; OSHA Safety and Health Standards, 29 CFR 1910, available as a hardcopy from the U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401, phone 1-202-512-0000, or as a free download from www.osha.gov. ED10B

identifying number to order label from manufacturer

Figure 7 — Text-and-symbols precautionary label for engine-driven equipment

Figure 8 is included as an example of an often-used, single-hazard precautionary label on engine-driven equipment and is parallel to that found in Figure 16.

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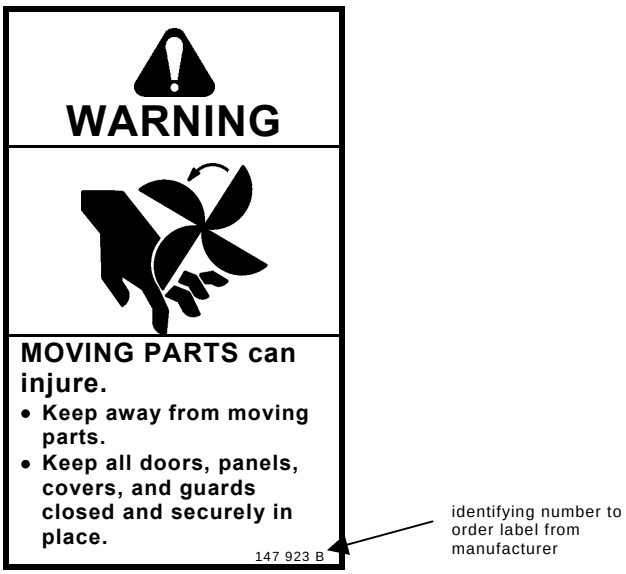
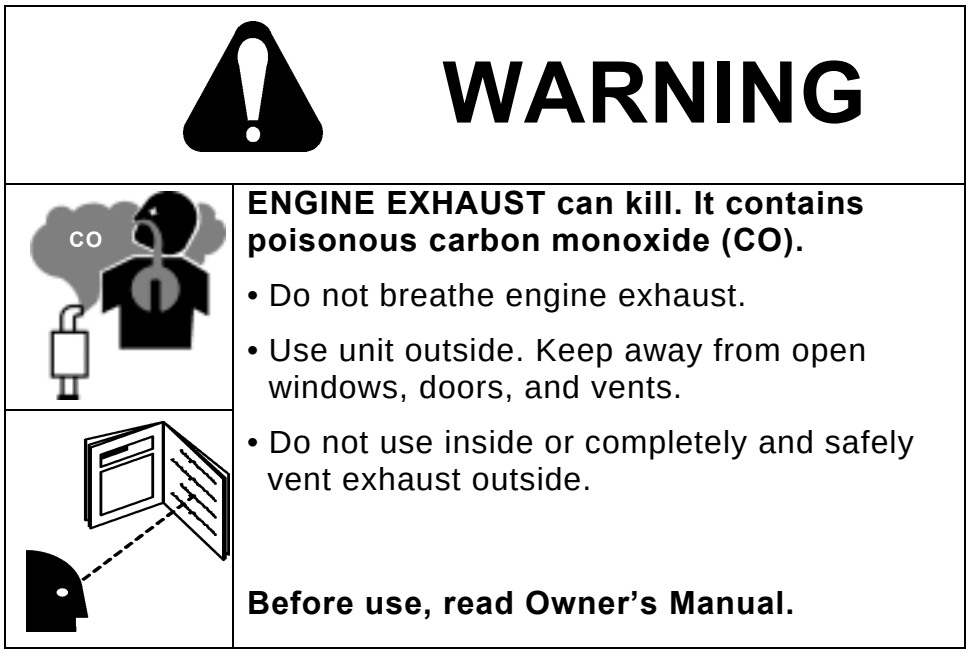


Figure 8 — Text-and-symbols single-hazard precautionary label for engine-driven equipment

Carbon monoxide is a component of engine exhaust. When addressing engine exhaust, the precautionary label example shown in Figure 9, or its equivalent, should appear on the product.



NOTE Underwriters Laboratories is developing the UL 2201 standard for portable engine generators that will include a safety label to address carbon monoxide exposure. NEMA will attempt to harmonize the label in Figure 9 with the UL 2201 safety label once UL 2201 is approved and published.

Figure 9 — Engine exhaust precautionary label

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6.4 Equipment used in process variations with additional hazards

Plasma arc cutting is an example of a process that can present additional hazards. Figure 10 shows a text-and-symbols precautionary label for plasma arc cutting equipment, and is parallel to that found in Figure 13.

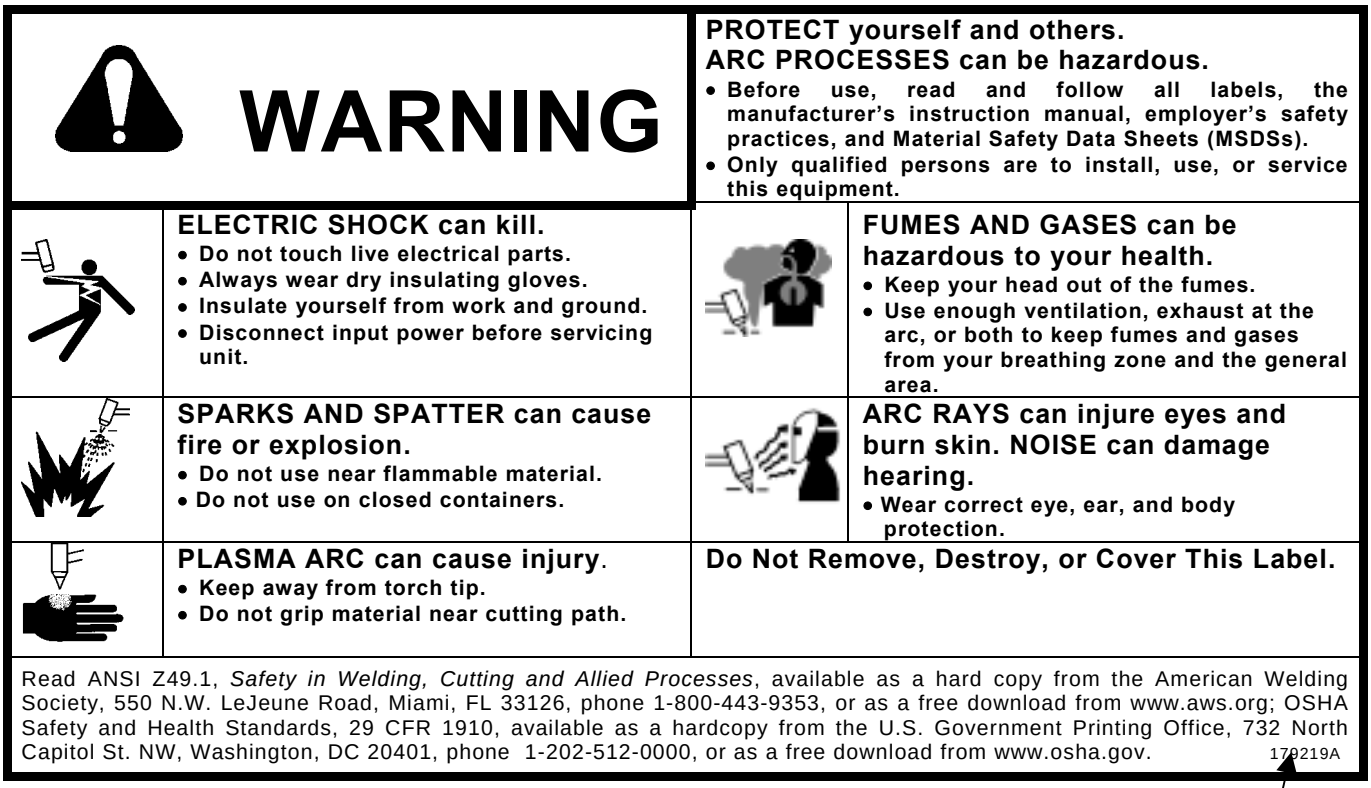

Figure 10 — Text-and-symbols precautionary label for plasma arc cutting equipment

6.5 Hazard alerting symbols

The hazard alerting symbols used in a precautionary label should conform to those in Table 1. Colors used for these symbols should be black on white, but white on black or other high contrast color combinations may be used. Per ANSI Z535.3, the minimum symbol block size shall be such that the symbol is legible at the intended viewing distance. As required, basic symbol elements may be combined (as is done for the electric shock symbol shown in Figures 5, 6, 7, and 10, and in the wordless labels appearing in clause 7).

Table 1 — Hazard alerting symbols

NO.	HAZARD	SOURCE OF HAZARD	SYMBOL	SOURCE (see note at end of table for explanation of acronyms)
1	ELECTRIC SHOCK	WELDING ELECTRODE		FMC, ISO, NEMA
2	ELECTRIC SHOCK	WIRING		FMC

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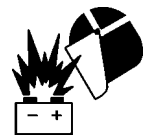
NO.	HAZARD	SOURCE OF HAZARD	SYMBOL	SOURCE (see note at end of table for explanation of acronyms)
3	ELECTRIC SHOCK	WELDING ELECTRODE AND WIRING		FMC, ISO, NEMA
4	FUMES AND GASES	ANY SOURCE		FMC, NEMA
5	FUMES AND GASES	WELDING FUMES AND GASES		FMC, ISO, NEMA
6	ARC RAYS	WELDING ARC		FMC, ISO, NEMA
7	FIRE	ENGINE FUEL		FMC
8	FUMES AND GASES	ENGINE EXHAUST		FMC, NEMA
9	FUMES AND GASES	ENGINE EXHAUST AND WELDING		FMC, ISO, NEMA
10	MOVING PARTS	MOVING PARTS SUCH AS FANS AND ROTORS		FMC, NEMA
11	LOUD NOISE	ENGINE, MACHINERY, AND ARC NOISE		FMC
12	FIRE OR EXPLOSION	WELDING SPARKS		FMC, ISO, NEMA
13	BATTERY EXPLOSION	EXPLOSIVE GASES FROM BATTERIES		FMC, ISO, NEMA, SAE

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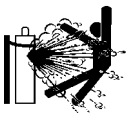
NO.	HAZARD	SOURCE OF HAZARD	SYMBOL	SOURCE (see note at end of table for explanation of acronyms)
14	BATTERY ACID	BATTERIES CONTAINING ACID		FMC, ISO, NEMA, SAE
15	HOT ENGINE COOLANT	ENGINE RADIATORS		FMC, NEMA, SAE
16	PACEMAKER MALFUNCTION	ELECTROMAGNETIC FIELDS & HIGH FREQUENCY ENERGY FROM WELDING		FMC, ISO, NEMA
17	PINCH POINTS ON MOVING PARTS	GEARS AND DRIVE ROLLS		FMC, NEMA
18	FALLING EQUIPMENT	FALLING OBJECTS		FMC
19	EXPLOSION	PRESSURIZED GAS CYLINDERS		FMC, ISO, NEMA
20	ELECTRIC SHOCK	PLASMA CUTTING TORCH		FMC, ISO, NEMA
21	FUMES AND GASES	PLASMA CUTTING ARC		FMC, ISO, NEMA
22	ARC RAYS	PLASMA CUTTING ARC		FMC, ISO, NEMA
23	FIRE OR EXPLOSION	PLASMA CUTTING SPARKS		FMC, ISO, NEMA
24	PACEMAKER MALFUNCTION	ELECTROMAGNETIC FIELDS & HIGH FREQUENCY ENERGY FROM PLASMA CUTTING		NEMA

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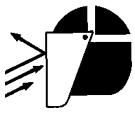
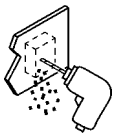
NO.	HAZARD	SOURCE OF HAZARD	SYMBOL	SOURCE (see note at end of table for explanation of acronyms)
25	PLASMA ARC	PLASMA CUTTING TORCH		FMC, ISO, NEMA
26	FUMES AND GASES	SHIELDING GAS CYLINDER OR OTHER GAS SOURCE		FMC, NEMA
27	HOT SURFACES	WORKPIECES FROM WELDING AND CUTTING; MUFFLER AND EXHAUST PIPES		FMC
28	WELDING WIRE	WELDING GUN AND WIRE		FMC, ISO, NEMA
29	FLYING PARTICLES	CHIPPING AND GRINDING		FMC
30	ELECTRIC MOTOR DAMAGE	INCORRECT CONNECTIONS TO AUXILIARY POWER		FMC, ISO
31	PC BOARD DAMAGE	STATIC ELECTRICITY		FMC, ISO, NEMA
32	EQUIPMENT DAMAGE	FILINGS AND TOOL CONTACT FROM DRILLING INTO HIDDEN PARTS		NEMA
33	FUEL SPRAY	PRESSURIZED FUEL IN TANK		FMC, NEMA
34	EXPLODING PARTS	ELECTRICAL COMPONENTS (SUCH AS CAPACITORS)		FMC, NEMA

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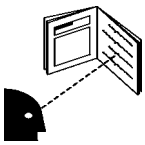
NO.	HAZARD	SOURCE OF HAZARD	SYMBOL	SOURCE (see note at end of table for explanation of acronyms)
35	ELECTRICAL INTERFERENCE	HIGH FREQUENCY RADIATION FROM WELDING AND WELDING EQUIPMENT		ISO, NEMA
36	FALLING EQUIPMENT	IMPROPER LIFTING OR MOVING		ANSI, IEC, ISO, NEMA
37	THIS SYMBOL IS THE INTERNATIONAL SAFETY ALERT SYMBOL. IT IS PLACED BEFORE THE SIGNAL WORD (DANGER, WARNING, CAUTION).			IEC, ISO, SAE
38	READ INSTRUCTION MANUAL			FMC, NEMA

NOTE Explanation of source acronyms:

ANSI	American National Standards Institute
FMC	FMC Corporation
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
NEMA	National Electrical Manufacturers Association
SAE	Society of Automotive Engineers

7 Symbols-only (wordless) precautionary labels

7.1 General

The intent of wordless precautionary labels is to reduce the need to use text in a label, thereby permitting all users, regardless of language or literacy, to readily understand the message being conveyed. The wordless precautionary labels use symbols to replace words from the mixed text-symbol labels.

General guidelines for wordless precautionary labels are as stated in 4.2 and 4.3. At a minimum, all wordless labels should contain the following:

a) a safety alert symbol;

b) color;

c) symbols appropriate to the type of product and application.

The symbols used should conform to those shown in Table 1 and in ISO 17846 as appropriate. Table 1 provides the statement of hazard symbols, and ISO 17846 provides all the other symbols as do the examples in this clause. Guidelines regarding the design of these graphics are as stated in clause 6.

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7.2 The basic wordless label

Figures 11 and 12 show wordless precautionary labels, in both vertical and horizontal formats respectively, for electrically powered arc welding equipment and all filler metal containers. The symbols contained in these labels represent those hazards encountered and precautions taken for all basic welding operations. Figure 11 also contains a text description, for use only in the instruction manual, of what each symbol represents.



Warning! Watch Out! There are possible hazards as shown by the symbols.

1 Electric shock from welding electrode or wiring can kill.

1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.

1.2 Protect yourself from electric shock by insulating yourself from work and ground.

1.3 Disconnect input plug or power before working on machine.

2 Breathing welding fumes can be hazardous to your health.

2.1 Keep your head out of the fumes.

2.2 Use forced ventilation or local exhaust to remove the fumes.

2.3 Use ventilating fan to remove fumes.

3 Welding sparks can cause explosion or fire.

3.1 Keep flammables away from welding. Don't weld near flammables.

3.2 Welding sparks can cause fires. Have a fire extinguisher nearby and have a watchperson ready to use it.

3.3 Do not weld on drums or any closed containers.

4 Arc rays can burn eyes and injure skin.

4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5 Become trained and read the instructions before working on the machine or welding.

6 Do not remove or paint over (cover) the label.

Figure 11 — Basic wordless label, vertical format

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Figure 12 — Basic wordless label, horizontal format

7.3 Plasma cutting equipment

Figure 13 shows the wordless precautionary label specifically for plasma arc cutting equipment. Figure 13 also contains a text description, for use only in the instruction manual, of what each symbol represents. If using wordless precautionary labels, all plasma arc cutting equipment should carry the symbols shown in Figure 13, or their equivalent, as well as the applicable symbols of Figure 14 if the equipment is engine-driven.

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Warning! Watch Out! There are possible hazards as shown by the symbols.

1 Cutting sparks can cause explosion or fire.

1.1 Keep flammables away from cutting. Do not cut near flammables.

1.2 Cutting sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.

1.3 Do not cut on drums or any closed container.

2. The plasma arc can cause injury and burns.

2.1 Turn off power before disassembling torch.

2.2 Do not grip material near cutting path.

2.3 Wear complete body protection.

3. Electric shock from torch or wiring can kill.

3.1 Wear dry insulating gloves. Do not wear wet or damaged gloves.

3.2 Protect yourself from electric shock by insulating yourself from work and ground.

3.3 Disconnect input plug or power before working on machine.

4 Breathing cutting fumes can be hazardous to your health.

4.1 Keep your head out of the fumes.

4.2 Use forced ventilation or local exhaust to remove the fumes.

4.3 Use ventilating fan to remove fumes.

5 Arc rays can burn eyes and injure skin.

5.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

6 Become trained and read the instructions before working on the machine or cutting.

7 Do not remove or paint over (cover) the label.

identifying number to order label from manufacturer

Figure 13 — Wordless precautionary label for plasma cutting equipment

7.4 Engine-driven welding equipment

Figure 14 shows the wordless precautionary label specifically for engine-driven welding equipment. Figure 14 also contains a text description, for use only in the instruction manual, of what each symbol represents. If using wordless labels, all engine-driven welding equipment should carry the applicable symbols shown in Figure 14, or their equivalent.

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Figure 14 — Wordless precautionary label for engine-driven welding equipment

7.5 Wire feeding equipment

Figure 15 shows the wordless precautionary label specifically for wire feeding equipment. Figure 15 also contains a text description, for use only in the instruction manual, of what each symbol represents. If using wordless precautionary labels, all wire feeding equipment should carry the symbols shown in Figure 15, or their equivalent.

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Warning! Watch Out! There are possible hazards as shown by the symbols.

A Drive rolls can injure fingers.

B Welding wire and drive parts are at welding voltage during operation—keep hands and metal objects away.

1 Electric shock can kill.

1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.

1.2 Protect yourself from electric shock by insulating yourself from work and ground.

1.3 Disconnect input plug or power before working on machine.

2 Breathing welding fumes can be hazardous to your health.

2.1 Keep your head out of the fumes.

2.2 Use forced ventilation or local exhaust to remove the fumes.

2.3 Use ventilating fan to remove fumes.

3 Welding sparks can cause explosion or fire.

3.1 Keep flammables away from welding. Don't weld near flammables.

3.2 Welding sparks can cause fires. Have a fire extinguisher nearby and have a watchperson ready to use it.

3.3 Do not weld on drums or any closed containers.

4 Arc rays can burn eyes and injure skin.

4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5 Become trained and read the instructions before working on the machine or welding.

6 Do not remove or paint over (cover) the label.

identifying number to order label from manufacturer

Figure 15 — Wordless precautionary label for wire feeding equipment

7.6 Specific hazards

Figures 16, 17, 18, and 19 are examples of wordless precautionary labels for specific hazards. These figures also contain a text description, for use only in the instruction manual, of what each symbol represents. A building block process combining elements from multiple precautionary labels for specific hazards should be used. Wherever possible, the symbol elements from Figure 11 or 12, and Figures 13, 14, and 15 should be used.

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1 Warning! Watch Out! There are possible hazards as shown by the symbols

2 Moving parts such as fans, rotors, and belts, can cut fingers and hands and cause injury. Keep away from moving parts

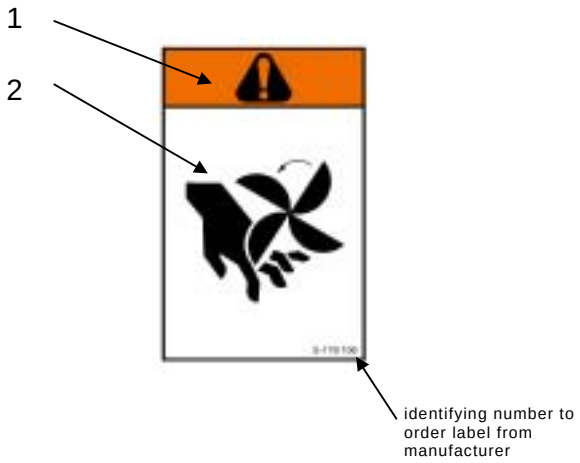

Figure 16 — Wordless precautionary label for a fan and moving parts

1 Warning! Watch Out! There are possible hazards as shown by the symbols.

2 Hot muffler and exhaust pipes can cause severe burns. Do not touch hot muffler of pipes

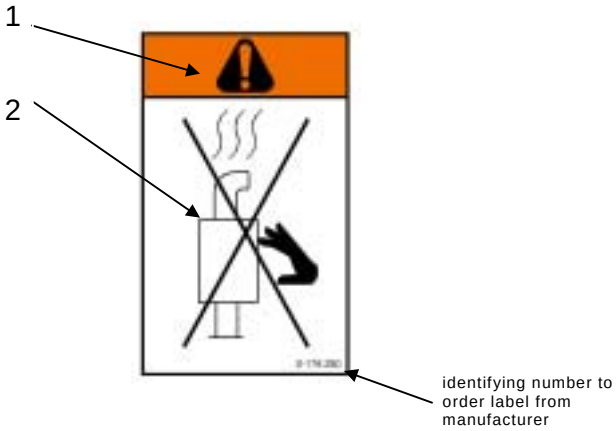

Figure 17 — Wordless precautionary label for a hot muffler

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1 Warning! Watch Out! There are possible hazards as shown by the symbols.
2 Engine fuel plus flames or sparks can cause fire.
3 Do not smoke while fueling or if near fuel.
4 Stop engine before fueling.
5 Do not fuel a hot engine.
6 Use Diesel Fuel only.

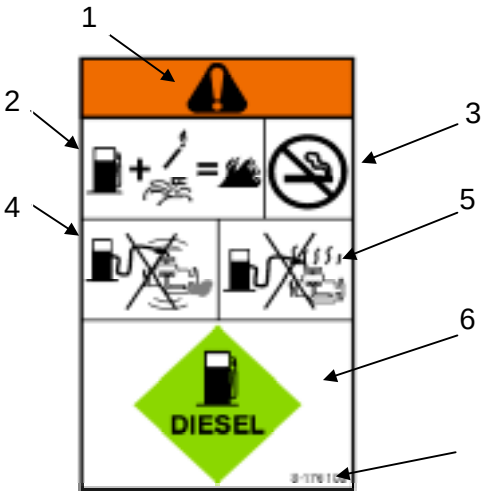

Figure 18 — Wordless precautionary label for diesel fuel

1 Warning! Watch Out! There are possible hazards as shown by the symbols.
2 Do not smoke and keep matches and flames away from battery.
3 Sparks can cause battery gases to explode. Battery explosion can blind and injure. Wear a face shield.
4 Battery acid can burn skin. Do not spill acid.
5 Read Owner's Manual.
6 Wear rubber gloves.
7 Dead battery.
8 Engine block.
9 Fully charged battery.
10 Do not connect last negative cable to dead battery— connect instead to engine block.
11 Jumper cables—observe polarity and make connections in numbered sequence shown.
12 Once dead battery is charged, disconnect cables in sequence shown.

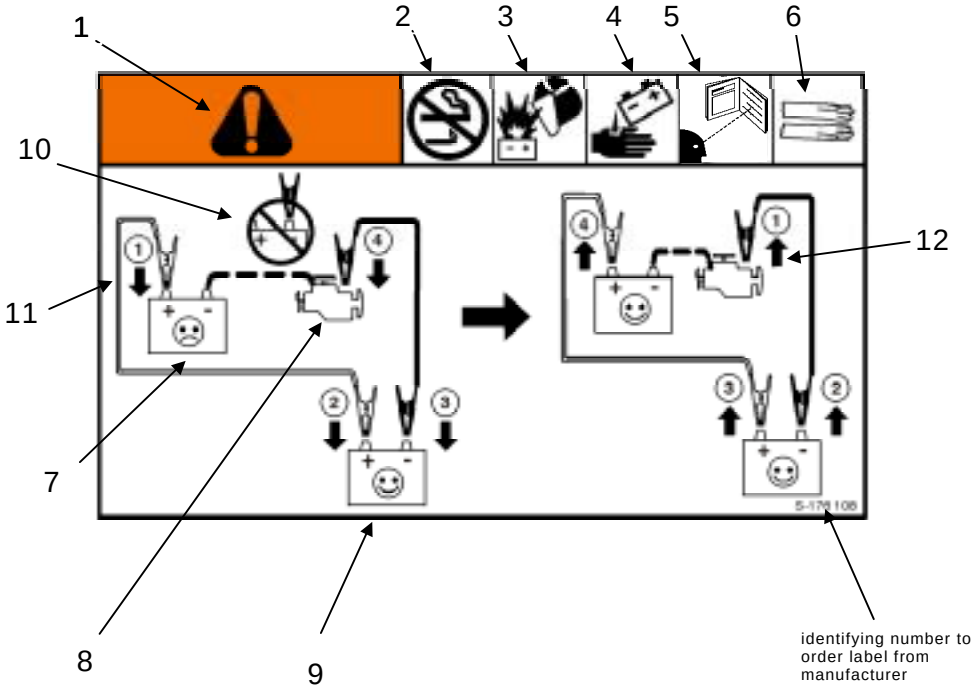

Figure 19 — Wordless precautionary label for battery charging

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