UL 120202

STANDARD FOR SAFETY

Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings

UL Standard for Safety for Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings, UL 120202

First Edition, Dated September 8, 2014

Summary of Topics

This revision of ANSI/UL 120202 dated April 11, 2022 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

Adoption of ANSI/ISA 12.02.02-2014, Standard for Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings, as ANSI/UL 120202. As noted in the Commitment of Amendments statement located on the back side of the title page, UL and ISA are committed to updating this co-designated standard jointly after processing according to the standards development procedures by UL.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

These requirements are substantially in accordance with Proposal(s) on this subject dated February 18, 2022.

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ISA – The International Society of Automation
ANSI/ISA 12.02.02-2014 (R2022)
First Edition

Underwriters Laboratories Inc.
ANSI/UL 120202
First Edition

Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings

September 8, 2014

(Title Page Reprinted: April 11, 2022)

Commitment for Amendments

This standard is issued jointly by ISA and Underwriters Laboratories Incorporated (UL). Comments or proposals for revisions on any part of the standard may be submitted to UL at any time.

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The most recent designation of ANSI/ISA-12.02.02 as a Reaffirmed American National Standard (ANSI) occurred on April 11, 2022.

This ANSI/UL Standard for Safety consists of the First Edition including revisions through April 11, 2022.

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General Notes

This is the common ISA and UL, Standard for the Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings. It is the first edition of ANSI/ISA-12.02.02 and the first edition of ANSI/UL 120202. The document is a modification of the ISA document to create the equivalent UL version and maintain the ANSI approval of this standard.

ANSI/ISA-12.02.02 and ANSI/UL 120202 contain identical requirements, and identical publication dates.

This common standard was prepared by (ISA) – The International Society of Automation on September 8, 2014 but is now being maintained by Underwriters Laboratories Inc. (UL).

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

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Preface (ISA)

This preface, as well as all footnotes and annexes, is included for information purposes and is not part of ANSI/ISA-12.02.02-2014 (R2022).

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1 Scope

1.1 This document provides guidance in the preparation of control drawings for intrinsically safe apparatus, associated apparatus, and intrinsically safe systems.

1.2 This document is intended to be used in conjunction with ANSI/UL 913, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations, and ANSI/ISA-60079-11, Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety “i”.

1.3 This document is not intended to include guidance for the design or installation of intrinsically safe equipment or systems.

1.4 A similar philosophy may be applied in the preparation of nonincendive field wiring control drawings, with appropriate modifications to address differences in the National Electrical Code®, NFPA 70, and applicable standards.

2 Purpose

This document has been formulated to provide guidance for, and to promote the uniformity of, manufacturers' control drawings for intrinsically safe apparatus, associated apparatus, and intrinsically safe systems.

3 Definitions

3.1
control drawing
a drawing or other document provided by the manufacturer for the intrinsically safe or associated apparatus, detailing the electrical parameters to allow for interconnections to other circuits or apparatus

3.2
entity concept
a method used to determine acceptable combinations of intrinsically safe apparatus and associated apparatus through the use of intrinsically safe parameters assigned to connection facilities

3.3
entity parameters
C_i: maximum equivalent internal capacitance of the apparatus which is considered as appearing across the connection facilities

I_{max} or I_i: maximum current (peak a.c. or d.c.) that can be applied to the connection facilities of apparatus without invalidating the type of protection

L_i: maximum equivalent internal inductance of the apparatus which is considered as appearing at the connection facilities

V_{max} or U_i: maximum voltage (peak a.c. or d.c.) that can be applied to the connection facilities of apparatus without invalidating the type of protection

P_i: maximum power that can be applied to the connection facilities of apparatus without invalidating the type of protection

C_a or C_o: maximum capacitance that can be connected to the connection facilities of the apparatus without invalidating the type of protection

I_{sc} or I_o: maximum current (peak a.c. or d.c.) in apparatus that can be taken from the connection facilities of the apparatus

L_a or L_o: maximum value of inductance that can be connected to the connection facilities of the apparatus without invalidating the type of protection

V_{oc} or U_o: maximum voltage (peak a.c. or d.c.) that can appear at the connection facilities of the apparatus at any applied voltage up to the maximum voltage

U_m: maximum voltage that can be applied to the non-intrinsically safe connection facilities of associated apparatus without invalidating the type of protection

P_o: maximum electrical power that can be taken from the apparatus

3.4
simple apparatus (as applied to intrinsic safety)
electrical component or combination of components of simple construction with well-defined electrical parameters and which is compatible with the intrinsic safety of the circuit in which it is used

4 General considerations

4.1 Types of control drawings

There are three basic types of control drawings:

a) Control drawings in which intrinsically safe apparatus is identified by manufacturer and model number, for connection to associated apparatus that is specified only by entity parameters (see Figure 1).

b) Control drawings in which associated apparatus is identified by manufacturer and model number, for connection to simple apparatus or to intrinsically safe apparatus that is specified only by entity parameters (see Figure 2).

c) Control drawings of intrinsically safe systems in which both the intrinsically safe apparatus and the associated apparatus are identified by manufacturer and model number (see Figure 3).

4.2 Availability

Control drawings should be readily available from the manufacturer. The information in the document is critical to the safe design and installation of an intrinsically safe system. Before equipment is purchased, the compatibility of the intrinsically safe apparatus and the associated apparatus as a system should be determined. Typically, the first person to have need of the control drawing is the system designer. Without the control drawings, the system designer cannot accurately specify the required equipment.

4.3 Drawing format

Control drawings should be of a size that easily can be distributed. The preferred sizes for control drawings are 8 1/2 x 11 (approximately A4) or 11 x 17 inches (approximately A3). Text size and figures should be legible when printed on an 8 1/2 x 11 or A4 size sheet. Several small sheets are preferable to one large sheet.

5 Drawing content

5.1 Wiring diagram

The control drawing should contain a wiring diagram showing interconnections of the intrinsically safe apparatus and the associated apparatus. It is not necessary to show internal circuitry of the equipment; however, information showing the operation of the equipment can be very useful to the system designer.

5.2 Equipment identification

The following minimum information should be provided:

5.2.1 Control drawings provided by the manufacturers of intrinsically safe apparatus (as shown in Figure 1) should identify the model number(s) and entity parameters of the intrinsically safe apparatus, and should specify the entity parameters for acceptable associated apparatus.

5.2.2 Control drawings provided by the manufacturers of associated apparatus (as shown in Figure 2) should identify the model number(s) and entity parameters of the associated apparatus, and should specify the entity parameters for acceptable intrinsically safe apparatus, or specify connection to simple apparatus.

5.2.3 Control drawings that specify the entire intrinsically safe system (as shown in Figure 3) should identify the model number(s) of both the associated apparatus and the intrinsically safe apparatus, and should specify the interconnection of the intrinsically safe apparatus and associated apparatus. Control drawings of this type may be provided by either the manufacturer of the associated apparatus or the manufacturer of the intrinsically safe apparatus.

5.3 Entity parameters

When entity parameters are provided, they should be supplied in a table or other suitable form, showing allowable values for each applicable class and group. When multi-channel associated apparatus is involved, the terminals to which the entity parameters apply should be clearly identified. It may be necessary to have more than one set of parameters for multiple terminals.

It is possible to have both system configuration and entity configuration shown on the same control drawing. In such cases, it is possible for the identified associated apparatus to have entity parameters that exceed the allowed entity parameters for the intrinsically safe apparatus. Evaluation using the entity concept results in the application of more than two faults. When equipment is evaluated as a system, only two faults are applied. The entity concept provides a great deal of flexibility for configuring a system, but at the expense of excluding some equipment that would be acceptable under a system evaluation.

5.4 Hazardous location identification

The control drawing should include a demarcation line between the hazardous (classified) and the nonhazardous (unclassified) locations, and should identify equipment that may be installed in each location. The hazardous locations should be identified by class, group(s), and division(s), or class, zone(s) and group(s).

5.5 Control drawing identification

The control drawing should be identified by manufacturer, identification number, sheet or page number of total, and some form of revision control (e.g., date or revision level).