

**ANSI/RIA R15.06-1999(R2009)**

# american national standard

*for Industrial Robots and Robot Systems —  
Safety Requirements*

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ANSI/RIA R15.06-1999(R2009)



**ROBOTIC INDUSTRIES ASSOCIATION**  
900 Victors Way, Suite 140  
Ann Arbor, MI 48108

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**ANSI/RIA R15.06-1999(R2009)**

Revision of  
ANSI/RIA R15.06-1992

American National Standard  
for Industrial Robots and Robot Systems —

**Safety Requirements**

Secretariat  
**Robotic Industries Association**

Approved June 21, 1999 (Reaffirmed Dec 8, 2009)  
**American National Standards Institute, Inc.**

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## **Foreword** (Not part of American National Standard ANSI/RIA R15.06-1999)

The objective of this standard is to enhance the safety of personnel using industrial robot systems by establishing requirements for the manufacture (including remanufacture and overhaul,) installation, safeguarding methods, maintenance and repair of manipulating industrial robots.

To accomplish this objective, the Robotic Industries Association Subcommittee R15.06 on Safety considered the variety of tasks necessary for the efficient and productive use of Industrial Robots. The operational scope and characteristics of a robot may be significantly different than other equipment and machines, and certain tasks may require persons to be in the proximity of the robot while drive power is available. An industrial robot may not be a stand-alone machine, but rather may interact with other machines and equipment.

To assist in the interpretation of this standard, the Subcommittee intended that the manufacturer (including remanufacturer and rebuilder,) the installer, and the end user have specific responsibilities. From a practical standpoint, the ultimate responsibility for safeguarding of persons associated with industrial robots and industrial robot systems lies with the person(s) themselves. Safety cannot be regulated by a book; it must be a conscious effort on the part of all parties (manufacturer, integrator, and user.) Necessary components in every safeguarding system are the maintenance of and adherence to the system design. Personnel skills, training, and attitude are important factors in a safety program. This standard only serves to provide guidelines to a safe operation.

Terms which are defined in clause 3 appear in **bold** type when used in other definitions, and the first time they are used in context within each clause. The words "shall" and "will" are intended to be prescriptive, and required to be in compliance with this standard. The words "should" and "may" are meant to be recommendations and good practices. Notes used throughout the document are generally meant to provide explanatory information, but may be normative when the word convention above is used.

This standard is a revision of ANSI/RIA R15.06-1992. Changes were incorporated based on public comments received, and an extensive review by the R15.06 Subcommittee. Some of the most significant changes include:

- Requirement to retrofit some existing installations with enabling devices and other safeguarding requirements not meeting a minimum criteria (1.3)
- A major reorganization of the text, creating clauses for the addition of responsibilities for the manufacturer of safety devices (clause 5), separate and enhanced clauses for safeguarding of personnel (clause 7 - Introduction; clause 8 - Prescribed method; clause 9 - Risk assessment method; and clause 10 - Procedures), and safeguard device installation requirements (clause 11), and renumbering of paragraphs
- Deletion of attended continuous operation, and revised requirements for Attended Program Verification (10.8)
- Requirement for separate stopping circuits, emergency stop and safety stop (4.6 and 6.12)

- Additional requirements regarding pendants and enabling devices (4.7); control circuitry (4.5 and 10.1); awareness signals for failure to reach intended location (4.2.2) and singularity (4.10); and mechanical axis stops (4.11 and 6.5)
- Specific clearance requirements for teach (10.7.7) and APV (10.8.5)
- Additional charts, tables, and informative annexes
- Use of the term "space" in place of "envelope" to describe three dimensional robot operating requirements

Industry standards, including this one, are voluntary. The Robotic Industries Association makes no determination with respect to whether any robot, associated safety devices, manufacturer, or user is in compliance with this standard.

This standard contains five (5) annexes, all of which are informative.

Suggestions for improvement of the standard are welcome. They should be sent to the:

RIA Subcommittee on Safety  
900 Victors Way, Suite 140  
Ann Arbor, MI 48108

Consensus for approval of this standard as an American National Standard was achieved by balloting of the R15 Standards Approval Committee of the Robotic Industries Association (an accredited standards developing organization). Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the R15 Standards Approval Committee had the following members:

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R15.03 Subcommittee for Mechanical Interface .....	Hadi Akeel
R15.05 Subcommittee for Performance .....	James Wells

<i>Organization Represented</i>	<i>Name of Representative</i>
R15.06 Subcommittee for Safety .....	Roberta Nelson
R15.07 Subcommittee for Simulation and Off-line Pgm .....	Craig Battles
	Carl Traynor (Alt.)
Robodyne Corporation .....	Joseph Alvité
Sandia National Laboratories .....	William Drotning
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Subcommittee R15.06 on Industrial Robot Safety, which developed this standard had the following members:

Roberta Nelson, Chair

Hadi A. Akeel	William Drotning	Thomas Pilz
Brad R. Barber	Robert Frease	Eugene Schlueter
John Beard	Steven Freedman	Joe Schultz
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# American National Standard for Industrial Robots and Robot Systems –

## Safety Requirements

### 0 Introduction

This standard assigns responsibilities for **industrial robot** safety to manufacturers, integrators, installers, and the **user**. Proper **safeguarding** of personnel is determined as prescribed in clause 8 or clause 9. The standard is best read in its entirety for full comprehension of requirements. Figure 1 gives a graphic presentation of the flow of responsibilities through the document.

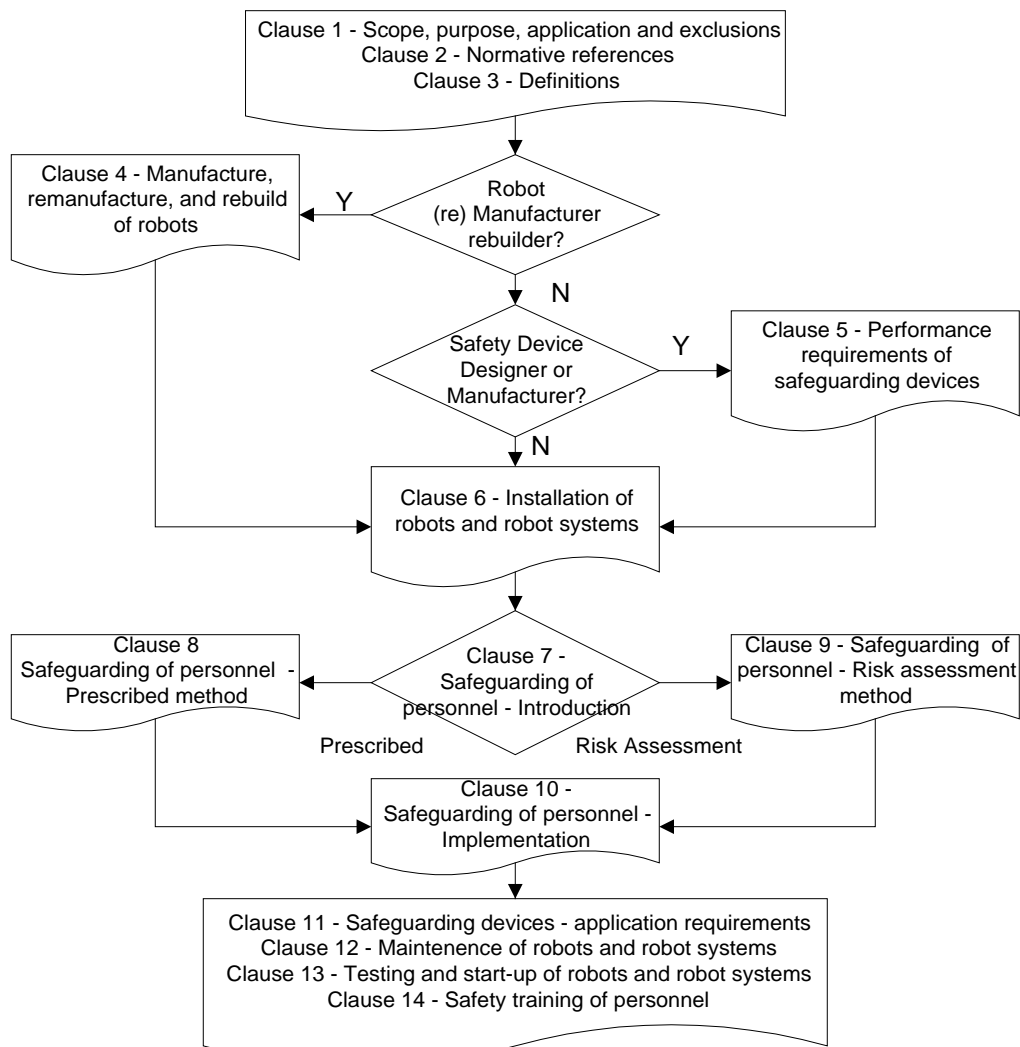


Figure 1 – Logic flow of document