B11.TR8 – 2022

Guide to Inspection of Risk Reduction Measures

ANSI–Accredited Standards Developer and Secretariat:

A Technical Report prepared by
B11 Standards, Inc.
POB 690905, Houston, TX 77269
www.b11standards.org

and

Registered: 3 JANUARY 2022
By the American National Standards Institute, Inc.

ABSTRACT

This Technical Report provides guidance for the inspection of existing risk reduction measures on a periodic basis. Guidelines for inspection documentation are also provided.

Published by: B11 Standards, Inc.
POB 690905, Houston, Texas 77269, USA

TABLE of CONTENTS PAGE

LIST of FIGURES

LIST of TABLES

FOREWORD

The objective of this B11 Technical Report is to provide guidance for sustaining safety systems through the use of inspections to maintain risk reduction measures on existing assets (e.g., equipment, machines/machinery, components and manufacturing/production lines) and to improve an organization's existing preventative or routine maintenance program or system. Application of these principles through the use of a standardized process will improve reliability and availability of production.

This Technical Report introduces three categories of inspections *(conversational; visual; technical)*. Each category of inspection has associated base–template checklists that will provide a framework for a safety inspection to be performed and contribute data to an organization's sustainability efforts. While it is understood that company organizations differ throughout industry in terms of size, category, structure, etc., the concepts and examples contained in B11.TR8 can be applied in a scalable manner to any organizational structure or size. Similarly, the three categories of inspections may be applied to a single machine/operation or to the entire organization. Regardless of the actual type of corporate organization, there are two fundamental aspects of these inspections: the **planning** for them and the **execution** of them. In large organizations, these functions may be accomplished in multiple sites or locations while in smaller organizations, they may be co–located or even performed by the same individual(s).

Being scalable is one of the key features in this document. Users can start the B11.TR8 process with a simple machine inspection, and then proceed to apply the process to a corporate–wide safety management system if they choose.

The key is providing standardized performance language, checklists, flow diagrams and visual controls to help users develop their own custom materials for performing inspections. The description of techniques and performance language, checklists, flow diagrams and visual diagrams in this document, are intended to help users develop their own custom materials for achieving a sustainable safety system. The writers of this document recognize that inspections should be custom tailored to fit the needs of the organization. One size does not fit all. However, there are common elements that offer a starting point for any organization to adopt and use B11.TR8.

Where appropriate, users are encouraged to modify templates and process models to suit their own needs. The process models of Plan•Do•Check•Act in this document should be considered generic models intended to assist in developing a tailored process for any specific organization. The elements of this approach and the interactive relationships explained in this Technical Report, establish a baseline structure for an organization to adjust and modify their existing inspection process(es). See Annex A for an example checklist to guide the organization through the evaluation and potential modification of their existing inspection process(es)." Also, this document is designed to support the requirements of the Safety Management Systems standards such as ISO 45001 and ANSI Z10.

Development

This Technical Report is not intended to replace good judgment and personal responsibility. Personnel skill, attitude, training and experience are safety factors that must be considered by the user. Details of procedures used as administrative controls are not covered in this document.

This Technical Report reflects a desired best industry practice. The inclusion or omission of language relative to any evolving technology or methodology in no way infers acceptance or rejection of such technologies. The presentation style used in this Technical Report mixes both informative and explanatory text and was chosen to enhance the readability of the information.

The ANSI B11 Standards Development Committee (SDC) for Machinery Safety Standards formed a subcommittee to develop this Technical Report which would provide a reliable process to maintain existing risk mitigation measures. The publication of this B11 Technical Report has been approved and recommended to ANSI for registration by B11 Standards, Inc., an ANSI–Accredited Standards Developing Organization. This document is registered as a Technical Report in the B11 series of publications according to the *Procedures for the Registration of ANSI Technical Reports* and the ANSI B11 SDC Operating Procedures. This document is not an American National Standard and the material contained herein is not normative in nature.

Comments on the content of this document or suggestions for improvement are welcome. They should be sent to: B11 Standards, Inc., PO Box 690905, Houston, TX 77269.

This Technical Report was prepared by the B11.TR8 Subcommittee, processed for comment/balloting by the B11 Standards Development Committee, and submitted for ANSI registration by the Secretariat. At the time this Technical Report was registered, the B11 SDC was composed of the following Member organizations:

Alan Metelsky, FS, Eng., Chair / Anne Mathias, PE, Vice–Chair / David Felinski, Secretary

Organizations Represented	**Name of Representative**	
	Delegate	**Alternate**
Association for Advancing Automation	Carole Franklin	Jeff Fryman
Aluminum Extruders Council	Melvin Mitchell, CSP	Bradley Wyatt, CSP
American Society of Safety Professionals	Ted Sberna	Anne Mathias, PE
Association For Manufacturing Technology	Russell Bensman	Alan Metelsky, FS Eng
The Boeing Company	Rhiannon McPherson	Mark Ellingson
Bridgestone	Kenji Furukawa, FS Eng	Joey Hinson, FS Eng
Canadian Standards Association	Andrea Holbeche, P.Eng.	Walter Veugen
Deere & Co.	Tony Beeth	Scott Winter
Euchner	Ron Yemmans	
Exponent	Stephen Andrew, PE	Torsten Skujins
FDR Safety	Michael Taubitz	Joe Wolfsberger, CIH
General Motors Corporation	Michael Douglas	Stacey Brooks
Grantek	Gerald Kupel	Patric Brown
IDEM Safety	Mark Witherspoon	Amir Mohtasham
Komatsu America Industries	George Schreck	James Landowski
Liberty Mutual	Craig Karasack, CSP	Julie Thompson, CSP
MAG Automotive	Erik Carrier	Doug Watts
Metal Powder Industries Federation	Bill Edwards	James Adams
National Institute for Occupational Safety & Health	Richard Current, PE	
Occupational Safety & Health Administration	Kenneth Stevanus	Mary Bauer, CIH, CSP
Omron Scientific Technologies Incorporated	Tina Hull, FS Exp	Frank Webster
Packaging Machinery Manufacturers Institute	Bruce Main, PE, CSP	Tom Egan
Pilz Automation Safety, LP	Michael Beerman, CMSP	Doug Sten, PhD, CSP
Plastics Industry Association	Jeff Linder	Dale Bartholomew
Precision Metalforming Association	James Barrett, Jr. PhD	David Klotz
Presence–sensing Device Manufacturers Association	James Kirton	Michael Carlson
Rockwell Automation	Michael Poynter, FS Eng	Darin Magnuson, FS Eng
Safe–T–Sense	Chris Gerges	Federico Badillo
SICK, Inc.	Chris Soranno, FS Exp	Nate Gose, FS Eng
Sheet Metal & Air Conditioning Contractors Nat'l. Assn.	Justin Crandol, CSP	Rick Di Ioli
Toyota Motor Manufacturing North America	Chip Boertlein	Michael Collier, B11 LMSS

At the time this Technical Report was approved, the **B11.TR8 Subcommittee** had the following members who participated in the development of this revision:

Name	**Organization**
Chris Gerges, **Co–Chair**	Safe–T–Sense, LLC
Mike Douglas, **Co–Chair**	General Motors
Chris Felinski, **Secretary**	B11 Standards, Inc.
Russ Bensman	Minster
Stanley Burson	Burson Consulting
Stacey Brooks	General Motors
Kenji Furukawa	Bridgestone
Bryan Harrell	Eli Lilly
Heinz Knackstedt	Machine Control Safety Training
Karen LaRue	Procter & Gamble
Brad Milleson	Kellogg
Jason Pestow	SICK, Inc.
Jenny Tuertscher	Fortress-Safety
Mike Taubitz	FDR Safety
Dustin Wiskes	Georgia Pacific
Dave Felinski, **Secretariat**	B11 Standards, Inc.

INTRODUCTION

Sustainability (also colloquially termed “the three ‘pillars’ of *People*, *Planet* and *Profit*”) is an integrated process that connects an organization’s social and environmental impacts with its financial profitability and sustainable growth. The B11 Technical Report #8 (B11.TR8) connects sustainability with the attributes of the ANSI B11 series of machinery safety standards and technical reports and focuses on the safety of people, while contributing to a positive influence on the culture and the productivity of the organization.

B11.TR8 describes a holistic approach to sustaining risk reduction measures using the continuous improvement model of Plan•Do•Check•Act (PDCA). PDCA is an iterative process where each improvement cycle results in lessons learned and a new current state, which can prompt development of the next Plan, and the cycle can then repeat.

Recognizing that the last step of each PDCA cycle is Act, real world experience in continuous improvement cultures indicates that this step typically includes an additional ‘sub-step’ – *Adjust* or *Abandon*, and that Adjust is often what happens since each revolution of Plan•Do•Check•Act (Adjust/Abandon) produces new learning and an opportunity to change existing means and methods. For simplicity, B11.TR8 will henceforth use PDCA (Adjust/Abandon), with the implicit understanding that Adjust and Abandon are used as appropriate.

To summarize, B11.TR8 is comprised of multiple PDCA processes to develop each step of an organization’s overall system.

Organization and Application of B11 Documents

The B11 standards and technical reports can be associated with the ISO “type A–B–C” structure as described immediately below, and as shown in **Figure 1**.

- **Type–A standards** (basis standards) give basic concepts, principles for design, and general aspects that can be applied to machinery;
- **Type–B standards** (generic safety standards) deal with one or more safety aspects or one or more types of safeguards that can be used across a wide range of machinery:
- **Type–C standards** (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines**.**

The B11.0 standard on the safety of machinery is primarily a “type –A” standard in that it applies to a broad array of machines and contains very general requirements. However, in many areas it also contains very specific requirements. B11.19, B11.20, B11.21, B11.25, B11.26, as well as the entire B11 series of Technical Reports are all typical “type–B” documents addressing general safety elements that can be used across a wide range of machinery (such as B11.19 and B11.26) or as a standard when combining machines (B11.20). The B11 series of technical Reports are informative documents that may be generally applied to many different machines, and as such would fall into the “type–B” category. The machine–specific (“type–C”) B11 standards contain detailed safety requirements for a particular machine or group of machines. The type–A B11.0 and the type–C (machine–specific) B11 standards are intended to be used concurrently by the supplier and user of machines. When a type–C standard deviates from one or more provisions dealt with by this standard or by a type–B standard, the type–C standard requirement generally takes precedence. Any deviation in conforming to a requirement of any standard should be carefully evaluated and based on a documented risk assessment.

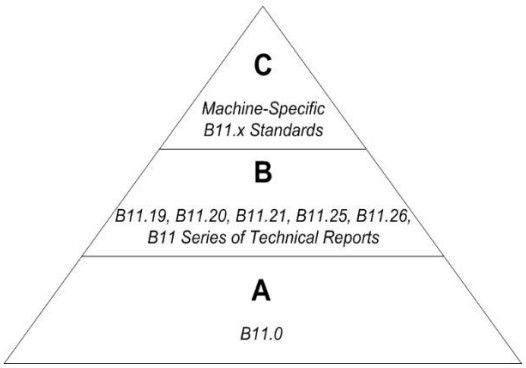

Figure 1 – Organization of the B11 series of documents

As of the date of approval of this Technical Report, the ANSI B11 series of American National Standards and Technical Reports on machinery safety consisted of the following documents shown in the list below. The user should check www.b11standards.org/current–standards or a licensed reseller (e.g., ANSI) for the current versions of any of these documents.
All archival / historical versions of the documents are available at www.b11standards.org/store.

List of the ANSI B11 Series of Safety Standards and Technical Reports

#	SHORT TITLE / TOPIC	YEAR	TYPE
B11.0	Safety of Machinery	2020	A
B11.1	Mechanical Power Presses	2009 (R20)	C
B11.2	Hydraulic & Pneumatic Power Presses	2013	C
B11.3	Power Press Brakes	2012	C
B11.4	Shears	2003 (R20)	C
B11.5	Ironworkers	1988 (R20)	C
B11.6	Manual Turning Machines w/ or without Auto Control	2001 (R20)	C
B11.7	Cold Headers and Cold Formers	1995 (R20)	C
B11.8	Manual Milling, Drilling, & Boring Machines	2021	C
B11.9	Grinding Machines	2010 (R20)	C
B11.10	Sawing Machines	2003 (R20)	C
B11.11	Gear and Spline Cutting Machines	2001 (R12)	C
B11.12	Roll Forming and Roll Bending Machines	2005 (R20)	C
B11.13	Single & Multiple–Spindle Automatic Bar and Chucking Machines	1992 (R20)	C
B11.14	Withdrawn (Coil Slitting Machines; combined into B11.18)	(1996)	C
B11.15	Pipe, Tube and Shape Bending Machines	2022	C
B11.16	Powder / Metal Compacting Presses	2014 (R20)	C
B11.17	Horizontal Hydraulic Extrusion Presses	2004 (R20)	C
B11.18	Machines Processing or Slitting Coiled or Non–Coiled Metal	2006 (R20)	C
B11.19	Performance Requirements for Risk Reduction Measures (Safeguarding)	2019	B
B11.20	Integration of Machinery into a System	2017	B
B11.21	Machine Tools Using Lasers for Processing Materials	2006 (R20)	B
B11.22	Turning Centers and Automatic Numerically Controlled Turning Machines	2002 (R20)	C
B11.23	Machining Centers & CNC Milling, Drilling & Boring Machines	2002 (R20)	C
B11.24	Transfer Machines	2002 (R20)	C
B11.25	Large Machines	2015 (R20)	B
B11.26	Functional Safety for Equipment / Machine Control Systems	2018	B
B11.27	Electro–Discharge Machines	2020	C
B11.TR1	Ergonomics	2016	B
B11.TR2	Metal Working Fluids	1997 (R16)	B
B11.TR3	Withdrawn (Risk Assessment / Risk Reduction Guide)	(2000 R15)	B
B11.TR4	Selection of Programmable Electronic Systems (PES/PLC)	2004 (R15)	B
B11.TR5	Noise Measurement	2006	B
B11.TR6	Withdrawn (Safety Control Systems for Machines)	(2010)	B
B11.TR7	Integration of Lean and Safety	2007 (R17)	B
B11.TR8	Guide to Inspection of Risk Reduction Measures	2022	B
B11.TR9	Cybersecurity	2019	B
B11.TR10	Guidance on Artificial Intelligence into Machinery Safety Applications	2020	B
ANSI/ISO 12100	Safety of machinery (identical adoption of ISO 12100–2010)	2012	A

Guide to Inspection of Risk Reduction Measures

1 Scope

This Technical Report introduces three categories of inspections; conversational inspections, visual inspections, and technical inspections. Applying the appropriate category to existing inspections improves communication, safety culture, and risk reduction measures. Although each of the three categories provide a benefit, it is not necessary for all categories to be used. The template checklists which are included may be modified to produce "organizational specific" checklists by either internal or external subject matter experts.

This Technical Report contains supporting inspection checklist templates. The checklist templates will provide guidance for the organization's inspection systems, by focusing on conversational, visual and technical inspection checklists.

Informative Note: See the table of contents for a listing of a variety of informative example annexes.

This Technical Report will provide an in–depth analysis of two concurrent PDCA processes of the Inspection Requirements Team ("R") and the Inspection Task Team ("T") as represented in Figure 2. The contents of this Technical Report will provide guidance for, but not be limited to:

- leadership commitment;
- improved quality;
- efficiency of the organization's inspection processes; and
- support safety sustainability efforts.

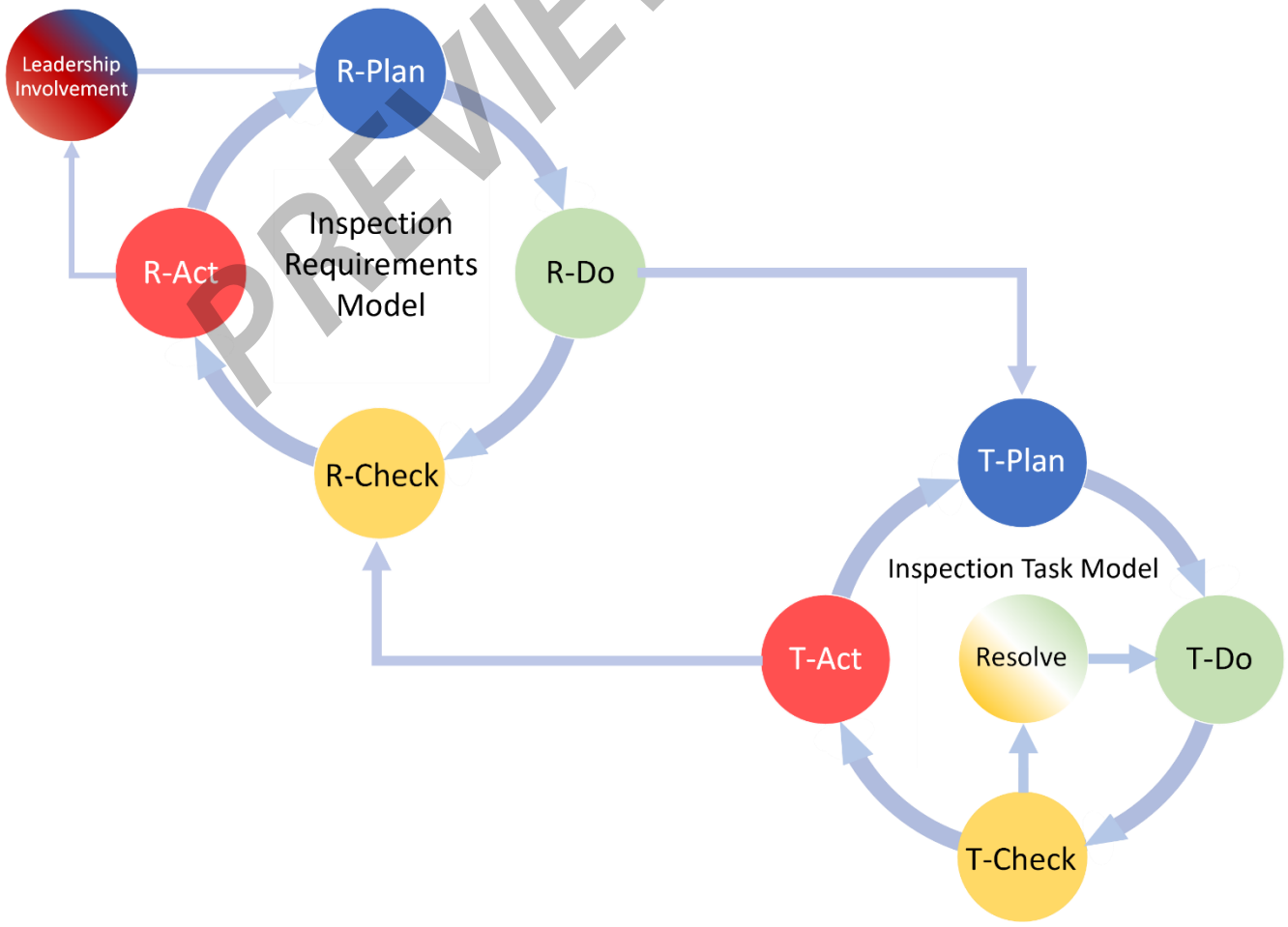

Figure 2 – Inspection Requirements & Task PDCA

1.1 Purpose

The purpose of this Technical Report is to provide guidance for inspecting risk reduction measures as applied to existing safety systems to verify they are within the specified parameters. This Technical Report describes a scalable approach for applications based on the principles of Plan•Do•Check•Act (Adjust/Abandon), and henceforth, simply "PDCA (Adjust / Abandon)."

2 References

The following documents contain provisions which constitute additional guidance or information for this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI B11.0–2020 *Safety of Machinery*

ANSI B11.19–2019 *Performance Requirements for Risk Reduction Measures: Safeguarding and Other Means for Reducing Risk*

ANSI B11.20–2017 *Safety Requirements for the Integration of Machinery into a System*

ANSI B11.26–2018 *Functional Safety for Equipment: General Principles for the Design of Safety Control Systems Using ISO 13849–1*

B11.TR7–2007 (R 2017) *Designing for Safety and Lean Manufacturing; A guide on integrating safety and lean manufacturing principles in the use of machinery*

ANSI/ASSP Z10–2019 *Occupational Health and Safety Management Systems*

ISO 45001:2018 *Occupational health and safety management systems – Requirements with guidance for use*

"*The Checklist Manifesto: How to Get things Right*" Atul Gawande, Metropolitan Books, 2009