

ANSI B11.25–2015

American National Standard for Machines –

Safety Requirements for Large Machines

Secretariat and Accredited Standards Developer:
B11 Standards, Inc.
POB 690905
Houston, TX 77269

Approved: **7 APRIL 2015**

by the
American National Standards Institute



COPYRIGHT PROTECTED DOCUMENT

Copyright © 2015 by B11 Standards, Inc.

All rights reserved. Printed in the United States of America

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of B11 Standards, Inc.

AMERICAN NATIONAL STANDARDS

By approving this American National Standard, the ANSI Board of Standards Review confirms that the requirements for due process, consensus, balance and openness have been met by B11 Standards, Inc. (the ANSI-accredited standards developing organization).

American National Standards are developed through a consensus process. Consensus is established when substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward resolution. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While B11 Standards, Inc. administers the process and establishes procedures to promote fairness in the development of consensus, it does not write the document and does not independently test, evaluate or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards or guidelines.

American National Standards are promulgated through ANSI for voluntary use; their existence does not in any respect preclude anyone, whether they have approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards. However, users, distributors, regulatory bodies, certification agencies and others concerned may apply American National Standards as mandatory requirements in commerce and industry.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of an American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the Secretariat (B11 Standards, Inc.).

B11 STANDARDS, INC. MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED AS TO THE FITNESS OF MERCHANTABILITY OR ACCURACY OF THE INFORMATION CONTAINED WITHIN THIS STANDARD, AND DISCLAIMS AND MAKES NO WARRANTY THAT THE INFORMATION IN THIS DOCUMENT WILL FULFILL ANY OF YOUR PARTICULAR PURPOSES OR NEEDS. B11 STANDARDS, INC. DISCLAIMS LIABILITY FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE WHATSOEVER, WHETHER SPECIAL, INDIRECT, CONSEQUENTIAL OR COMPENSATORY, DIRECTLY OR INDIRECTLY RESULTING FROM THE PUBLICATION, USE OF, APPLICATION OR RELIANCE ON THIS DOCUMENT. B11 STANDARDS, INC. DOES NOT UNDERTAKE TO GUARANTEE THE PERFORMANCE OF ANY INDIVIDUAL MANUFACTURER OR SELLER'S PRODUCTS OR SERVICES BY VIRTUE OF THIS STANDARD OR GUIDE, NOR DOES IT TAKE ANY POSITION WITH RESPECT TO THE VALIDITY OF ANY PATENT RIGHTS ASSERTED IN CONNECTION WITH THE ITEMS WHICH ARE MENTIONED IN OR ARE THE SUBJECT OF THIS DOCUMENT. B11 STANDARDS, INC. DISCLAIMS LIABILITY FOR THE INFRINGEMENT OF ANY PATENT RESULTING FROM THE USE OF OR RELIANCE ON THIS DOCUMENT. USERS OF THIS DOCUMENT ARE EXPRESSLY ADVISED THAT DETERMINATION OF THE VALIDITY OF ANY SUCH PATENT RIGHTS, AND THE RISK OF INFRINGEMENT OF SUCH RIGHTS, IS ENTIRELY THEIR OWN RESPONSIBILITY.

In publishing or making this document available, B11 Standards, Inc. is not undertaking to render professional or other services for or on behalf of any person or entity, nor is B11 Standards, Inc. undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment, or as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

B11 Standards, Inc. has no power, nor does it undertake to police or enforce conformance to the requirements of this document. B11 Standards, Inc. does not certify, test or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of conformance to any health or safety-related information in this document shall not be attributable to B11 Standards, Inc. and is solely the responsibility of the certifier or maker of the statement.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. You may contact the Secretariat for current status information on this, or other B11 standards.

Published by: B11 Standards, Inc., POB 690905, Houston, TX 77269-0905, USA
Copyright © 2015 by B11 Standards, Inc.
All rights reserved. Printed in the United States of America

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Table of Contents

Page

Contents

FOREWORD	v
INTRODUCTION	iv
1 SCOPE	10
1.1 EXCLUSIONS	10
2 NORMATIVE REFERENCES	11
3 DEFINITIONS	13
4 RESPONSIBILITY	13
4.1 SUPPLIER RESPONSIBILITIES	13
4.2 USER RESPONSIBILITIES	14
4.3 MODIFIER RESPONSIBILITIES	14
4.4 PERSONNEL RESPONSIBILITIES	14
5 RISK ASSESSMENT PROCESS	14
5.1 GENERAL	14
5.2 TASKS	16
5.3 POTENTIAL HAZARDS	17
5.3.1 Reasonably foreseeable hazards	17
5.3.2 Hazards not associated with tasks	18
6 DESIGN, CONSTRUCTION, RECONSTRUCTION, AND MODIFICATION	19
6.1 GENERAL REQUIREMENTS FOR LARGE MACHINES	19
6.2 RISK REDUCTION MEASURES	20
6.2.1 Hydraulic / pneumatic aspects	20
6.2.2 Troubleshooting, set-up or maintenance	21
6.2.3 Entrapment	21
6.2.4 Tripping hazards	21
6.2.5 Lighting	22
6.2.6 Concurrent tool changes	22
6.2.7 Stopping time / distance	22
6.2.8 Part transfer	22
6.2.9 Moving work station	22
6.3 LADDERS, WORK PLATFORMS, AND WALKWAYS	22
6.4 ENTERING THE WORKING ENVELOPE	24
6.5 TOTAL ENCLOSED LARGE MACHINES	25
6.5.1 Risk reduction measures	25
6.6 LAYOUT DESIGN REQUIREMENTS	25
6.7 ELECTRICAL EQUIPMENT REQUIREMENTS	26
6.7.1 Grounding and shielding	26
6.7.2 Interferences	26
6.7.3 Fluctuation or interruption of power sources	26
6.8 MODES OF OPERATION	26
6.8.1 Automatic mode(s)	26
6.8.2 Manual mode(s)	27
6.8.3 Mode design	27
6.8.4 Mode selection	27
6.8.5 Process observation	28
6.9 LOCAL CONTROL	28

6.10	ISOLATION OF POWER SOURCES	29
6.11	STORED ENERGY.....	29
6.12	CONTROL OF GRAVITY INDUCED MOTION	30
6.13	EMERGENCY MOVEMENT.....	30
6.14	PERFORMANCE OF THE SAFETY–RELATED PARTS OF THE CONTROL SYSTEM.....	30
6.15	CONTROL SYSTEM RESET.....	30
6.16	SYSTEM STARTING/RESTARTING.....	31
6.17	EMERGENCY STOP	31
6.17.1	Emergency stop function.....	31
6.17.2	Emergency stop devices.....	32
6.17.3	Recovery from emergency stop.....	32
6.18	FLUID IMPACT ON OPERATING ENVIRONMENT AND EQUIPMENT	32
6.18.1	Slip hazard.....	32
6.19	MECHANICAL EQUIPMENT REQUIREMENTS.....	33
6.19.1	Power transmission components.....	33
6.19.2	Powered moving parts	33
6.19.3	Broken or falling machine components or equipment	33
6.19.4	Contact with high-temperature surfaces or components	33
6.19.5	Contact with sharp edges, corners, and projections.....	33
6.20	SAFEGUARDING DESIGN REQUIREMENTS	34
6.21	EJECTED PARTS OR FLUIDS	34
6.22	VIEWING PANELS/WINDOWS	35
6.23	STRUCTURAL INTEGRITY	35
6.24	NOISE	35
6.25	ERGONOMIC CONSIDERATIONS	36
6.26	LOCATION OF AWARENESS DEVICES	36
6.27	ERRORS OF FITTING	36
6.28	MACHINE STABILITY	36
6.29	DOCUMENTATION REQUIREMENTS	36
6.30	REQUIREMENTS FOR REBUILD OR MODIFICATIONS	37
7	LAYOUT, INSTALLATION, TESTING & START-UP	38
7.1	LAYOUT.....	38
7.2	LIFTING OF SYSTEM COMPONENTS.....	39
7.3	INSTALLATION.....	40
7.3.1	Installation personnel	40
7.3.2	Transport into and through a facility.....	41
7.3.3	Floor loading.....	41
7.3.4	Machine mounting	41
7.3.5	Electrical requirements for installation.....	41
7.3.6	Isolation of power sources.....	41
7.3.7	Lighting.....	42
7.3.8	Lockout / tagout / verify during installation	42
7.4	TESTING AND START-UP	42
8	SAFEGUARDING	43
8.1	GENERAL	43
8.1.1	Point of operation	43
8.1.2	Unexpected release of energy.....	43
8.1.3	Moving hazard zone.....	43
8.1.4	Points of entry.....	43
8.1.5	Suitability for application	44
8.1.6	Safe distance safeguarding	44
8.1.7	Operator control station location(s).....	44
8.1.8	Entrapment	44
8.1.9	Elevation changes.....	44
8.1.10	Slips and falls.....	44
8.2	VIEWING PANELS / TRANSPARENT GUARDS	45
8.3	ACTIVATION OF SAFETY CONTROL SYSTEM	45

8.4	OPERATOR LOCATION.....	46
8.5	PENDANT CONTROL.....	46
8.6	SUSPENSION OF SAFEGUARD.....	46
8.7	CLEARING THE MACHINE ENVELOPE.....	46
8.8	NOISE.....	46
8.9	FIRE SUPPRESSION / ATMOSPHERE DIFFERENTIALS / CONFINED SPACE.....	46
8.10	SAFEGUARDING AT THE PERIMETER.....	47
8.11	SAFETY-RELATED SPAN OF CONTROL.....	47
8.12	SAFETY-RELATED SYSTEM RESET.....	47
9	SET-UP, OPERATION AND MAINTENANCE.....	49
9.1	GENERAL.....	49
9.2	MACHINE SET-UP PROCEDURES.....	49
9.3	OPERATION.....	50
9.4	MAINTENANCE.....	51
9.4.1	<i>Maintenance procedures.....</i>	<i>51</i>
9.4.2	<i>Maintenance inspections.....</i>	<i>52</i>
9.5	SUPERVISION.....	53
9.6	CONTROL OF HAZARDOUS ENERGY.....	53
9.6.1	<i>Isolation of power sources.....</i>	<i>54</i>
9.6.2	<i>Routine servicing and maintenance.....</i>	<i>54</i>
9.6.3	<i>Non-routine servicing and maintenance.....</i>	<i>55</i>
9.7	INITIATION OF PRODUCTION OPERATIONS.....	55
9.8	SAFETY SIGNS.....	55
9.9	PERSONAL PROTECTIVE EQUIPMENT (PPE).....	55
10	TRAINING.....	56
10.1	GENERAL.....	56
10.2	TRAINING ELEMENTS.....	56
10.2.1	<i>Training program(s).....</i>	<i>57</i>
10.2.2	<i>Trainer qualifications.....</i>	<i>58</i>
10.3	OPERATOR TRAINING.....	59
10.4	MAINTENANCE PERSONNEL TRAINING.....	59
10.5	SUPERVISOR TRAINING.....	59
10.6	RETRAINING.....	60
	ANNEX A – LARGE MACHINES AND OTHER.....	61
	ANNEX B – GENERAL GUIDELINES FOR OPERATOR TRAINING.....	62
	ANNEX C – SOME EXAMPLES OF LARGE MACHINES.....	65