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# CONTENTS

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## HISTORY AND BACKGROUND

## ACKNOWLEDGMENT

## INTRODUCTION

<b>CHAPTER 1 TERMINOLOGY AND DEFINITIONS</b> .....	1-1
<b>CHAPTER 2 CRITICAL LIFTS</b> .....	2-1
<b>2.1 CRITICAL-LIFT DETERMINATION</b> .....	2-1
<b>2.2 CRITICAL-LIFT REQUIREMENTS</b> .....	2-2
<b>CHAPTER 3 PREENGINEERED PRODUCTION LIFTS</b> .....	3-1
<b>3.1 PREENGINEERED PRODUCTION LIFT DETERMINATION</b> .....	3-1
<b>3.2 LIFTING FIXTURES</b> .....	3-2
3.3.1 Design .....	3-2
3.3.2 Fabrication .....	3-2
3.3.3 Inspection and Testing .....	3-2
3.3.4 Storage, Maintenance, and Control.....	3-2
3.3.5 Modification and Repair .....	3-3
<b>3.3 PROCEDURES</b> .....	3-4
3.4.1 Content.....	3-4
3.4.2 Development.....	3-4
3.4.3 Preparation and Revision .....	3-4
3.4.4 Approval .....	3-5
3.4.5 Review .....	3-5
3.4.6 Use .....	3-5
<b>3.4 DESIGNATED LEADER</b> .....	3-6
<b>3.5 TRAINING</b> .....	3-7
3.6.1 Equipment Operation .....	3-7
3.6.2 Procedure .....	3-7

<b>CHAPTER 4 LIFTING PERSONNEL</b> .....	4-1
<b>4.1 GENERAL</b> .....	4-1
4.1.1 Personnel Lifting Evaluation .....	4-1
4.1.2 Designated Leader .....	4-1
4.1.3 Trial Lift.....	4-2
4.1.4 Lifting Operations.....	4-2
<b>4.2 MOBILE CRANES</b> .....	4-5
<b>4.3 OVERHEAD CRANES</b> .....	4-6
<b>4.4 PERSONNEL LIFT PLATFORM</b> .....	4-7
4.4.1 Platform Design and Construction.....	4-7
4.4.2 Platform Suspension System.....	4-7
<b>4.5 INSPECTIONS</b> .....	4-9
4.5.1 Frequent Inspection.....	4-9
4.5.2 Periodic Inspection.....	4-9
<b>4.6 TESTING</b> .....	4-10
4.6.1 Platform Manufacturer Test.....	4-10
4.6.2 Rated Load Test .....	4-10
4.6.3 Hoisting Equipment .....	4-10
<b>4.7 LIFTING PERSONNEL NEAR ELECTRICAL POWER LINES</b> .....	4-11
4.7.1 General.....	4-11
4.7.2 Condition A.....	4-11
4.7.3 Condition B.....	4-11
4.7.4 Condition C.....	4-12
Exhibit I      Personnel Lift Platform Pre-Lift Inspection .....	4-15
Exhibit II     Personnel Lifting Planning and Authorization Form.....	4-16

## **CHAPTER 5 HOSTILE ENVIRONMENTS**

<b>5.1 GENERAL</b> .....	5-1
<b>5.2 HOSTILE ENVIRONMENT PLAN</b> .....	5-2
5.2.1 Marking and Posting .....	5-2
5.2.2 Inspection and Testing .....	5-2
Exhibit I      Hostile Environment Plan.....	5-3

## **CHAPTER 6 PERSONNEL QUALIFICATION AND TRAINING**

<b>6.1</b>	<b>GENERAL</b> .....	6-1
<b>6.2</b>	<b>QUALIFICATIONS</b> .....	6-2
6.2.1	General.....	6-2
6.2.2	Operators of Cab-Operated and Pulpit-Operated.....	6-2
6.2.3	Operators of Mobile Cranes.....	6-2
6.2.4	Operators of Truck Mounted Cranes – Capacity 1 Ton or Less .....	6-4
6.2.5	Operators of Floor-Operated Cranes.....	6-4
6.2.6	Operators of Forklift Trucks .....	6-4
6.2.7	Operators of Remote Operated Cranes .....	6-4
6.2.8	Riggers .....	6-4
6.2.9	Person-In-Charge (PIC) .....	6-4
6.2.10	Designated Leader .....	6-5
6.2.11	Inspectors .....	6-5
6.2.12	Instructors .....	6-5
6.2.13	First-Line Supervisors.....	6-5
6.2.14	Maintenance Personnel .....	6-5
<b>6.3</b>	<b>TRAINING</b> .....	6-7
6.3.1	General.....	6-7
6.3.2	Cab-Operated, Pulpit-Operated, and Floor-Operated Cranes .....	6-7
6.3.3	Mobile Crane Operators.....	6-8
6.3.4	Operators of Truck Mounted Cranes – Capacity 1 Ton or Less .....	6-8
6.3.5	Forklift Truck Operators .....	6-8
6.3.6	Riggers .....	6-10
6.3.7	Inspectors .....	6-10
6.3.8	Instructors .....	6-11
6.3.9	Maintenance Personnel .....	6-11
<b>6.4</b>	<b>REQUALIFICATION</b> .....	6-12
<b>6.5</b>	<b>RECORDS</b> .....	6-13
<b>CHAPTER 7 OVERHEAD AND GANTRY CRANES</b> .....		7-1
<b>7.1</b>	<b>GENERAL</b> .....	7-1
7.1.1	Operator Training/Qualification .....	7-1
7.1.2	Rated-Load marking .....	7-1
7.1.3	Modification.....	7-1
7.1.4	Egress.....	7-1
7.1.5	Hoist Brakes.....	7-1
7.1.6	Power Shutoff .....	7-1
7.1.7	Hoist-Limit Switch.....	7-5
7.1.8	Load Limits.....	7-5
7.1.9	Maintenance History .....	7-5

<b>7.2</b>	<b>INSPECTIONS</b> .....	7-6
7.2.1	General .....	7-6
7.2.2	Crane Service .....	7-6
7.2.3	Initial Inspection .....	7-6
7.2.4	Daily Preoperational Check .....	7-6
7.2.5	Monthly Rope, Chain and Hook Inspection .....	7-6
7.2.6	Frequent Inspection.....	7-7
7.2.7	Periodic Inspection.....	7-7
	7.2.7.1 Cranes .....	7-7
	7.2.7.2 Wire Rope .....	7-8
	7.2.7.3 Chain (Welded Link) .....	7-8
	7.2.7.4 Chain (Roller) .....	7-9
7.2.8	Cranes Not in Regular Service.....	7-11
<b>7.3</b>	<b>TESTING</b> .....	7-12
7.3.1	Operational Tests .....	7-12
7.3.2	Rated Load Test .....	7-12
<b>7.4</b>	<b>MAINTENANCE</b> .....	7-14
7.4.1	Operating Equipment .....	7-14
7.4.2	Wire-Rope Maintenance .....	7-14
<b>7.5</b>	<b>OPERATION</b> .....	7-15
7.5.1	Conduct of Operator .....	7-15
7.5.2	Hoist-Limit Switch/Device .....	7-15
7.5.3	Standard Hand Signals.....	7-16
7.5.4	Identification of Signalers.....	7-16
7.5.5	Size of Load .....	7-16
7.5.6	Attaching the Load.....	7-16
7.5.7	Moving the Load.....	7-16
7.5.8	Ordinary Lifts.....	7-18
7.5.9	Planned Engineered Lifts.....	7-18
7.5.10	Critical Lifts .....	7-19
Exhibit I	Bridge, Wall, Gantry Crane Load Test .....	7-22
Exhibit II	Overhead Crane Pre-Operational Checklist.....	7-26
Exhibit III	Overhead Crane Periodic Inspection Report (Mechanical) .....	7-28
Exhibit IV	Overhead Crane Periodic Inspection Report (Electrical).....	7-30
<b>CHAPTER 8</b>	<b>HOISTS</b> .....	<b>8-1</b>
<b>8.1</b>	<b>GENERAL</b> .....	<b>8-1</b>
8.1.1	Operator Training/Qualification .....	8-4
8.1.2	Marking.....	8-4
8.1.3	Warning Labels.....	8-4

8.1.3.1	Electric- or Air-Powered Hoists.....	8-4
8.1.3.2	Hand-Chain-Operated or Manual-Lever-Operated Hoists.....	8-4
8.1.4	Design Standards .....	8-5
8.1.5	Design Factors .....	8-5
8.1.6	Load-Braking/Load-Controlling Mechanisms.....	8-5
8.1.6.1	Electric-Powered Hoists.....	8-5
8.1.6.2	Air-Powered Hoists.....	8-5
8.1.6.3	Hand-Chain-Operated Hoists.....	8-6
8.1.6.4	Manual-Lever-Operated Hoists .....	8-6
8.1.7	Wire Rope .....	8-6
8.1.8	Load Chain.....	8-6
8.1.8.1	Electric-Powered, Air-Powered, and Manual-Lever-Operated Hoists .....	8-6
8.1.8.2	Hand-Chain-Operated Hoists.....	8-6
8.1.9	Web Strap.....	8-7
8.1.10	Overtravel Protection .....	8-7
8.1.10.1	Travel Warning Devices .....	8-7
8.1.10.2	Lower-Limit Switches/Devices .....	8-7
8.1.11	Travel Warning Devices .....	8-7
8.1.12	Support.....	8-7
8.1.13	Location .....	8-7
8.1.14	Load Rating.....	8-7
<b>8.2</b>	<b>INSPECTIONS .....</b>	<b>8-8</b>
8.2.1	Hoist Service.....	8-8
8.2.2	Initial Inspection .....	8-8
8.2.3	Daily Inspection .....	8-8
8.2.4	Frequent Inspection.....	8-8
8.2.5	Periodic Inspection.....	8-8
8.2.5.1	Hoists .....	8-9
8.2.5.2	Wire Rope .....	8-9
8.2.5.3	Welded-Link Chain.....	8-10
8.2.5.4	Roller Chain .....	8-11
8.2.5.5	Synthetic-Web Strap .....	8-12
8.2.6	Hoists Not in Regular Service.....	8-12
<b>8.3</b>	<b>TESTING.....</b>	<b>8-13</b>
8.3.1	Operational Tests .....	8-13
8.3.1.1	Electric- or Air-Powered Hoists.....	8-13
8.3.1.2	Hand-Chain-Operated Hoists.....	8-13
8.3.1.3	Manual-Lever-Operated Hoists .....	8-13
8.3.2	Proof-Load Test .....	8-13
8.3.2.1	Electric- or Air-Powered Hoists.....	8-13
8.3.2.2	Hand-Chain-Operated or Manual-Lever-Operated Hoists.....	8-13
<b>8.4</b>	<b>MAINTENANCE.....</b>	<b>8-16</b>

<b>8.5</b>	<b>OPERATION</b> .....	8-17
8.5.1	Conduct of Operator .....	8-17
8.5.2	Size of Load .....	8-17
8.5.3	Attaching the Load.....	8-17
8.5.4	Moving the Load.....	8-17
8.5.5	Hoist-Limit Switch.....	8-18
8.5.6	Ordinary Lifts.....	8-18
8.5.7	Planned Engineered Lifts .....	8-19
8.5.8	Critical Lifts .....	8-19

Exhibit I	Hoist Load Test and Inspection .....	8-24
Exhibit II	Underhung Hoist Periodic Inspection Report .....	8-26

**CHAPTER 9 MOBILE CRANES**.....9-1

<b>9.1</b>	<b>GENERAL</b> .....	9-1
9.1.1	Operator Training/Qualification .....	9-1
9.1.2	Load Limits .....	9-1
9.1.3	Load Rating Chart.....	9-1
9.1.4	Load Hoist Brakes.....	9-6
9.1.5	Power-Controlled Lowering .....	9-6
9.1.6	Booms .....	9-6
9.1.7	Counterweight.....	9-6
9.1.8	Rerating.....	9-6
9.1.9	Maintenance History .....	9-6
9.1.10	Design Standards .....	9-6

<b>9.2</b>	<b>INSPECTIONS</b> .....	9-7
9.2.1	General .....	9-7
9.2.2	Initial Inspection .....	9-7
9.2.3	Preoperational Check .....	9-7
9.2.4	Monthly Inspection .....	9-7
9.2.5	Frequent Inspection.....	9-7
9.2.6	Periodic Inspection.....	9-8
	9.2.6.1 Cranes .....	9-8
	9.2.6.2 Hydraulic and Pneumatic Hose, Fittings, and Tubing .....	9-9
	9.2.6.3 Hydraulic and Pneumatic Pumps and Motors.....	9-9
	9.2.6.4 Hydraulic and Pneumatic Valves.....	9-9
	9.2.6.5 Hydraulic and Pneumatic Cylinders .....	9-9
	9.2.6.6 Hydraulic Filters .....	9-9
	9.2.6.7 Wire Rope .....	9-9
9.2.7	Load Hoods/Load Blocks .....	9-11
9.2.8	Cranes Not in Regular Use .....	9-11

<b>9.3</b>	<b>TESTING</b> .....	9-12
------------	----------------------	------

9.3.1	Operational Tests .....	9-12
9.3.2	Rated Load Test .....	9-12
<b>9.4</b>	<b>MAINTENANCE</b> .....	9-13
9.4.1	Preventive Maintenance .....	9-13
9.4.2	Maintenance Procedures .....	9-13
9.4.3	Wire-Rope Maintenance .....	9-13
<b>9.5</b>	<b>OPERATION</b> .....	9-15
9.5.1	Conduct of Operator .....	9-15
9.5.1.1	Traveling the Machine .....	9-16
9.5.1.2	Making Adjustments or Repairs .....	9-16
9.5.1.3	Ensuring Stability.....	9-17
9.5.1.4	Further Safety Considerations.....	9-18
9.5.2	Operating Near Power Lines and Transmitter Towers .....	9-18
9.5.2.1	Crane Operations De-energized and Grounded Electrical Power Lines.....	9-19
9.5.2.2	Power Lines Energized, Crane Operating Less Than Erected/Fully Extended Boom Length Away From Prohibited Zone.....	9-19
9.5.2.3	Crane Operations are Within the Prohibited Zone and the Power Lines are Energized .....	9-22
9.5.2.4	Crane in Transit with no Load and Boom Lowered .....	9-22
9.5.2.5	Crane Operations Near Transmitter Towers .....	9-22
9.5.3	Hoist-Limit Switch.....	9-22
9.5.4	Standard Hand Signals .....	9-25
9.5.5	Identification of Signalers.....	9-25
9.5.6	Size of Load .....	9-25
9.5.7	Attaching the Load.....	9-25
9.5.8	Moving the Load.....	9-25
9.5.9	Ordinary Lifts.....	9-29
9.5.10	Critical Lifts .....	9-30
Exhibit I	Mobile Crane Load Test .....	9-33
Exhibit II	Mobile Crane Daily Pre-Operational Check.....	9-37
Exhibit III	Mobile Crane Frequent Inspection Report.....	9-41
Exhibit IV	Mobile Crane Periodic Inspection Report.....	9-43
<b>CHAPTER 10</b>	<b>FORKLIFT TRUCKS</b> .....	10-1
<b>10.1</b>	<b>GENERAL</b> .....	10-1
10.1.1	Operator Training/Qualification .....	10-1
10.1.2	Rated Capacity .....	10-1
10.1.3	Nameplate(s) and Markings .....	10-1
10.1.3.1	Fork Arm Data .....	10-1

10.1.4	Attachments .....	10-1
10.1.5	Modifications .....	10-2
10.1.6	Warning Devices.....	10-2
10.1.7	Overhead Guards .....	10-2
10.1.8	Fire Hazard Areas .....	10-2
10.1.9	Work Atmosphere.....	10-2
<b>10.2</b>	<b>TYPE DESIGNATIONS AND AREAS OF USE.....</b>	<b>10-10</b>
10.2.1	Type Designation.....	10-10
10.2.1.1	Nonhazardous Areas .....	10-10
10.2.1.2	Hazardous Areas .....	10-10
10.2.2	Specific Areas of Use.....	10-11
<b>10.3</b>	<b>INSPECTIONS .....</b>	<b>10-14</b>
10.3.1	Daily Preoperational Check .....	10-14
10.3.2	Initial Inspection of New and Rented Equipment.....	10-14
10.3.3	Inspection and Maintenance .....	10-14
10.3.4	Forks .....	10-15
10.3.4.1	Fork Load Rating .....	10-15
10.3.4.2	Fork Inspections.....	10-15
10.3.4.3	Fork Repair .....	10-16
10.3.5	Battery Maintenance .....	10-16
10.3.6	History File .....	10-17
<b>10.4</b>	<b>TESTING.....</b>	<b>10-18</b>
10.4.1	Forklift Truck Load Test.....	10-18
10.4.2	Fork Load Test.....	10-18
10.4.3	Attachment Load Test.....	10-18
<b>10.5</b>	<b>OPERATION .....</b>	<b>10-19</b>
10.5.1	Conduct of Operator .....	10-19
10.5.1.1	General.....	10-19
10.5.1.2	Traveling.....	10-20
10.5.1.3	Loading .....	10-21
10.5.2	Lifting of Personnel .....	10-22
10.5.3	Standard Hand Signals.....	10-24
10.5.4	Ordinary Lifts.....	10-24
10.5.5	Critical Lifts .....	10-24
10.5.6	Equipment Qualifications .....	10-24
Exhibit I	Operations Pre-Shift Inspection Form .....	10-29
Exhibit II	Forklift Load Test and Inspection Form .....	10-31
<b>CHAPTER 11</b>	<b>WIRE ROPE AND SLINGS.....</b>	<b>11-1</b>
<b>11.1</b>	<b>GENERAL.....</b>	<b>11-1</b>



<b>11.2</b>	<b>WIRE ROPE</b> .....	11-4
11.2.1	Wire-Rope Lays .....	11-4
11.2.2	Wire-Rope Cores .....	11-4
11.2.3	Wire Rope for General Purposes .....	11-4
11.2.3.1	6 x 19 Classification.....	11-4
11.2.3.2	6 x 37 Classification.....	11-5
11.2.4	Wire-Rope Inspections.....	11-5
11.2.5	Wire-Rope Maintenance .....	11-5
<b>11.3</b>	<b>SLINGS</b> .....	11-8
11.3.1	General.....	11-8
11.3.1.1	Load Angle Factor .....	11-8
11.3.1.2	Safe Load .....	11-8
11.3.1.3	Design Factor .....	11-10
11.3.1.4	Sling Care.....	11-10
11.3.1.5	Sling Storage.....	11-10
11.3.1.6	Inspections .....	11-10
11.3.1.7	Sling Periodic Inspection Records .....	11-10
11.3.2	Wire-Rope Slings.....	11-10
11.3.2.1	Removal from Service Criteria .....	11-20
11.3.2.2	Proof-Testing .....	11-20
11.3.2.3	Operation.....	11-20
11.3.2.4	Critical Lifts.....	11-23
11.3.3	Alloy Steel-Chain Slings.....	11-24
11.3.3.1	Removal from Service Criteria .....	11-25
11.3.3.2	Annual Inspections.....	11-25
11.3.3.3	Proof-Testing .....	11-26
11.3.3.4	Operation.....	11-28
11.3.3.5	Critical Lifts .....	11-29
11.3.4	Metal-Mesh Slings .....	11-29
11.3.4.1	Removal from Service Criteria .....	11-32
11.3.4.2	Proof-Testing .....	11-32
11.3.4.3	Operation.....	11-32
11.3.4.4	Critical Lifts .....	11-33
11.3.5	Synthetic-Web Slings.....	11-33
11.3.5.1	Removal from Service Criteria .....	11-36
11.3.5.2	Proof-Testing .....	11-36
11.3.5.3	Operation.....	11-40
11.3.5.4	Critical Lifts .....	11-40
11.3.6	Synthetic Roundslings .....	11-41
11.3.6.1	Removal from Service Criteria .....	11-41
11.3.6.2	Proof-Testing .....	11-42
11.3.6.3	Operation.....	11-42
11.3.6.4	Critical Lifts.....	11-43

<b>CHAPTER 12</b>	<b>RIGGING ACCESSORIES</b> .....	12-1
<b>12.1</b>	<b>GENERAL</b> .....	12-1
12.1.1	Good and Bad Rigging Practices .....	12-1
<b>12.2</b>	<b>RIGGING HOOKS</b> .....	12-5
12.2.1	Design .....	12-5
12.2.2	Marking.....	12-5
12.2.3	Construction.....	12-5
12.2.4	Load Limits.....	12-5
12.2.5	Inspections .....	12-5
12.2.6	Testing.....	12-6
12.2.7	Maintenance.....	12-6
12.2.8	Operation.....	12-6
<b>12.3</b>	<b>SHACKLES</b> .....	12-7
12.3.1	General.....	12-7
12.3.2	Effects of Environment.....	12-7
12.3.3	Training.....	12-7
12.3.4	Inspections .....	12-7
12.3.5	Removal Criteria.....	12-8
12.3.6	Repairs .....	12-8
12.3.7	Critical Lifts .....	12-8
<b>12.4</b>	<b>EYEBOLTS</b> .....	12-11
12.4.1	General.....	12-11
12.4.2	Effects of Environment.....	12-11
12.4.3	Training.....	12-11
12.4.4	Inspections .....	12-11
12.4.5	Removal Criteria.....	12-12
12.4.6	Repairs .....	12-12
12.4.7	Critical Lifts .....	12-12
<b>12.5</b>	<b>EYE NUTS</b> .....	12-14
12.5.1	General.....	12-14
12.5.2	Effects of Environment.....	12-14
12.5.3	Training.....	12-14
12.5.4	Inspections .....	12-14
12.5.5	Removal Criteria.....	12-15
12.5.6	Repairs .....	12-15
12.5.7	Critical Lifts .....	12-15
<b>12.6</b>	<b>TURNBUCKLES</b> .....	12-16
12.6.1	General.....	12-16

12.6.2	Operating Practices .....	12-16
12.6.3	Effects of Environment .....	12-16
12.6.4	Training.....	12-16
12.6.5	Inspections .....	12-16
12.6.6	Removal Criteria.....	12-17
12.6.7	Repairs .....	12-17
12.6.8	Critical Lifts .....	12-17
<b>12.7</b>	<b>LINKS, RINGS, AND SWIVELS .....</b>	<b>12-19</b>
12.7.1	General.....	12-19
12.7.2	Operating Practices .....	12-19
12.7.3	Effects of Environment .....	12-19
12.7.4	Training.....	12-19
12.7.5	Inspections .....	12-19
12.7.6	Removal Criteria.....	12-20
12.7.7	Repairs .....	12-20
12.7.8	Critical Lifts .....	12-20
<b>12.8</b>	<b>SWIVEL HOIST RINGS .....</b>	<b>12-21</b>
12.8.1	General.....	12-21
12.8.2	Effects of Environment .....	12-21
12.8.3	Training.....	12-21
12.8.4	Inspections .....	12-21
12.8.5	Removal Criteria.....	12-22
12.8.6	Repairs .....	12-22
12.8.7	Critical Lifts .....	12-22
<b>12.9</b>	<b>LOAD-INDICATING DEVICES .....</b>	<b>12-25</b>
12.9.1	General.....	12-25
12.9.2	Critical Lifts .....	12-25
<b>12.10</b>	<b>PRECISION LOAD POSITIONERS .....</b>	<b>12-26</b>
12.10.1	General.....	12-26
12.10.2	Critical Lifts .....	12-26
<b>12.11</b>	<b>COMPRESSION HARDWARE.....</b>	<b>12-27</b>
12.11.1	General.....	12-27
12.11.2	Assembly – Wire Rope Clips.....	12-27
12.11.3	Assembly – Wedge Sockets.....	12-27
12.11.4	Effects of Environment .....	12-28
12.11.5	Training.....	12-28
12.11.6	Inspections .....	12-28
12.11.7	Removal Criteria.....	12-28
12.11.8	Repairs .....	12-29
12.11.9	Critical Lifts .....	12-29

<b>CHAPTER 13 LOAD HOOKS</b> .....	13-1
<b>13.1 GENERAL</b> .....	13-1
13.1.1 Marking.....	13-1
13.1.2 Attachments .....	13-1
13.1.3 Load Limits.....	13-1
13.1.4 Hook Standards.....	13-1
<b>13.2 INSPECTIONS</b> .....	13-2
13.2.1 Hook Service.....	13-2
13.2.2 Initial Inspection .....	13-2
13.2.3 Daily Inspection.....	13-2
13.2.4 Frequent Inspection.....	13-2
13.2.5 Periodic Inspection.....	13-2
<b>13.3 TESTING</b> .....	13-4
<b>13.4 NONDESTRUCTIVE TESTING (NDT)</b> .....	13-6
13.4.1 NDT Requirements .....	13-6
13.4.2 NDT Records .....	13-6
13.4.3 NDT Methods .....	13-6
13.4.4 Acceptance Criteria.....	13-6
13.4.5 Discontinuity Removal .....	13-6
<b>13.5 MAINTENANCE</b> .....	13-8
<b>13.6 OPERATION</b> .....	13-9
Exhibit I      Exhibit Hood Periodic Inspection Report.....	13-11
<b>CHAPTER 14 BELOW-THE-HOOK LIFTING DEVICES</b> .....	14-1
<b>14.1 GENERAL</b> .....	14-1
<b>14.2 STRUCTURAL AND MECHANICAL LIFTING DEVICES</b> .....	14-2
14.2.1 Design/Fabrication.....	14-2
14.2.2 Marking.....	14-2
14.2.3 Modification/Rerating.....	14-2
14.2.4 Guarding .....	14-2
14.2.5 Inspections .....	14-2
14.2.5.1 Initial Inspection .....	14-2
14.2.5.2 Frequent Inspection.....	14-2
14.2.5.3 Periodic Inspection.....	14-3
14.2.6 Testing.....	14-3
14.2.6.1 Operational Test.....	14-3
14.2.6.2 Rated Load Test .....	14-7

14.2.7	Maintenance .....	14-7
14.2.8	Training/Qualification.....	14-7
14.2.9	Operation.....	14-7
14.2.10	Critical Lifts .....	14-8
<b>14.3</b>	<b>VACUUM LIFTING DEVICES.....</b>	<b>14-9</b>
14.3.1	Design/Fabrication .....	14-9
14.3.2	Marking .....	14-9
14.3.3	Installation.....	14-11
14.3.4	Inspections .....	14-11
	14.3.4.1 Initial Inspection .....	14-11
	14.3.4.2 Frequent Inspection.....	14-11
	14.3.4.3 Periodic Inspection.....	14-11
14.3.5	Testing.....	14-12
	14.3.5.1 Operational Test.....	14-12
	14.3.5.2 Rated Load Test .....	14-12
14.3.6	Maintenance .....	14-12
14.3.7	Training/Qualification.....	14-12
14.3.8	Operation.....	14-13
14.3.9	Critical Lifts .....	14-14
<b>14.4</b>	<b>MAGNETS, CLOSE-PROXIMITY-OPERATED .....</b>	<b>14-15</b>
14.4.1	Design/Fabrication .....	14-15
14.4.2	Marking .....	14-15
	14.4.2.1 Rated Load (Capacity) .....	14-17
	14.4.2.2 Controls.....	14-17
14.4.3	Installation.....	14-17
14.4.4	Inspections .....	14-17
	14.4.4.1 Initial Inspection .....	14-17
	14.4.4.2 Frequent Inspection.....	14-17
	14.4.4.3 Periodic Inspection.....	14-17
14.4.5	Testing .....	14-18
	14.4.5.1 Operational Test.....	14-18
	14.4.5.2 Rated Load Test .....	14-18
14.4.6	Maintenance .....	14-18
14.4.7	Training/Qualification.....	14-19
14.4.8	Operation.....	14-19
	14.4.8.1 External-Powered Electromagnets.....	14-20
	14.4.8.2 Battery-Operated Electromagnets .....	14-20
	14.4.8.3 Electrically Controlled Permanent Magnets .....	14-20
	14.4.8.4 Manually Controlled Permanent Magnets .....	14-20
14.4.9	Critical Lifts .....	14-20
<b>14.5</b>	<b>MAGNETS, REMOTE-OPERATED .....</b>	<b>14-21</b>
14.5.1	Design/Fabrication .....	14-21
14.5.2	Marking .....	14-21

14.5.3	Installation.....	14-21
14.5.4	Inspections .....	14-21
14.5.4.1	Initial Inspection .....	14-21
14.5.4.2	Frequent Inspection.....	14-21
14.5.4.3	Periodic Inspection.....	14-21
14.5.5	Testing .....	14-23
14.5.5.1	Operational Test.....	14-23
14.5.6	Maintenance .....	14-23
14.5.7	Training/Qualification.....	14-23
14.5.8	Operation.....	14-24
14.5.9	Critical Lifts .....	14-24
Exhibit I	Lifting Bars and Spreaders Load Test and Inspection .....	14-27

**CHAPTER 15                    CONSTRUCTION HOISTING AND RIGGING  
EQUIPMENT REQUIREMENTS .....** 15-1

**15.1    GENERAL                    .....** 15-1

**15.2    PERSONNEL QUALIFICATIONS.....** 15-2

15.2.1 Qualified Operators of Mobile Cranes..... 15-2

15.2.2 Qualified Operators of Forklift Trucks .....

15.2.3 Qualified Riggers .....

15.2.4 Person-in-Charge (PIC) .....

15.2.5 Designated Leader .....

15.2.6 Inspector.....

15.2.7 Maintenance .....

**15.3    INSPECTION AND TESTING .....** 15-6

**15.4    OPERATION .....** 15-7

15.4.1 General .....

15.4.2 Wire Rope Slings .....

**15.5    STEEL ERECTION .....** 15-8

15.5.1 General .....

15.5.2 Definitions.....

15.5.3 Pre-Shift Inspection of Cranes .....

15.5.4 Qualified Rigger.....

15.5.5 Lifting Personnel.....

15.5.6 Safety Latches .....

15.5.7 Working Under Loads.....

15.5.8 Multiple Load Lifts .....

**CHAPTER 16                    MISCELLANEOUS LIFTING DEVICES.....** 16-1

<b>16.1</b>	<b>GENERAL</b> .....	16-1
	16.1.1 Operator Training/Qualifications.....	16-1
	16.1.2 Rated-Load Markings, Safety Markings and Operating Instructions .	16-1
	16.1.3 Modifications .....	16-1
	16.1.4 Load Limits.....	16-2
	16.1.5 Operating Controls.....	16-2
	16.1.6 Load Hook .....	16-2
	16.1.7 Wire Rope .....	16-2
	16.1.7 Assembly.....	16-2
<b>16.2</b>	<b>INSPECTIONS</b> .....	16-5
	16.2.1 General.....	16-5
	16.2.2 Initial Inspection .....	16-5
	16.2.3 Daily Preoperational Inspection.....	16-5
	16.2.4 Periodic Inspection.....	16-5
<b>16.3</b>	<b>TESTING</b> .....	16-7
	16.3.1 Operational Test.....	16-7
	16.3.2 Rated Load Test .....	16-7
<b>16.4</b>	<b>MAINTENANCE</b> .....	16-8
<b>16.5</b>	<b>OPERATION</b> .....	16-9
	16.5.1 Conduct of Operator .....	16-9
<b>CHAPTER 17..... REFERENCES</b>		
<b>APPENDIX A ..... PROCUREMENT GUIDELINES</b>		

## History and Background

In 1975, cognizant safety and health personnel at the U.S. Department of Energy (DOE) Headquarters (HQ) met to discuss the need for a DOE hoisting and rigging manual. At that meeting, existing, applicable hoisting and rigging codes, standards, and regulations, such as the Occupational Safety and Health Administration (OSHA) 29 CFR 1910, the American National Standards Institute (ANSI) B-30 series, and others, were reviewed in detail. Subsequently, it was determined that these documents, while adequate as minimum general industry standards, did not contain the detail necessary to adequately accomplish the extremely complex, critical, and hazardous hoisting and rigging operations being performed at DOE sites, in all probability, at other government agency and private sectors throughout the country. Because of the high potential for accidents that could result in significant property loss or serious personnel injury or death, it was decided that a DOE hoisting and rigging manual was not only desirable but absolutely necessary.

Preliminary work on the manual was initiated in 1976. The manual that was developed at that time incorporated the minimum requirements of OSHA, ANSI, and similar documents and also included additional more stringent requirements deemed necessary to adequately control hoisting and rigging work processes throughout DOE. Each phase of the manual was then critically reviewed by DOE and contractor personnel. A final draft was completed in 1978 and implemented on a trial basis.

In June 1980, a decision was made to formally issue and distribute the manual under controlled distribution, an arrangement where the manual must be specifically requested from the originating source; however, once requested, updates are automatically received through an actively maintained distribution list. In 1982, the manual was included as a reference standard in DOE 5480.4, "Environmental Protection, Safety, and Health Protection Standards." Updates and improvements have been made over the years on an approximately annual basis. Revisions have occurred in 1984, 1985, 1986, 1988, 1989, 1993, 1995, 1996, 1999, 2001, 2004 and 2007 to clarify intent, comply with OSHA and ANSI B-30 changes, improve format, strengthen wording, delete needless redundancy, eliminate obsolescence, and the like. Prior to inclusion in the manual, all changes must be approved by the DOE Hoisting and Rigging Committee, which meets annually, and by the Headquarters Office of Worker Safety and Health Policy, which has safety responsibility for DOE hoisting and rigging. The Committee is also a major source for input into the manual, particularly concerning those areas that are not defined or are only generally defined by Federal and national standards, such as training and qualification, and those concerning the DOE's unique operational environment, such as hoisting and rigging over nuclear reactors and other locations containing critical equipment. In the years that minor revisions occur, only the changed pages, usually 8 to 10, are sent to individuals on the distribution list. After two to three such supplements, the manual is reissued in its entirety, which incorporates the previous supplements plus the most recent unpublished changes approved by the committee. An example is the complete revision issued in 1993 followed by another complete revision in 1996, 1999, 2001 and 2004 without any intervening supplements. In this case, the supplements were omitted because of the numerous improvements incorporated within the very short time period.

The reissued June 1995 edition marked a change in classification. The DOE Office of Scientific and Technical Information (OSTI) reclassified the manual as a handbook and it was issued as DOE Hoisting and Rigging Handbook (DOE-HDBK-1090-95). After further review, OSTI has reclassified the handbook as a DOE Technical Standard and the September 1996 edition was issued as DOE STANDARD HOISTING AND RIGGING (Formerly Hoisting and Rigging Manual) DOE-STD-1090-96 (Rev-1). Additional revisions issued are DOE-STD-1090-99, DOE-STD-1090-2001, DOE-STD-1090-2004, and DOE-STD-1090-2007..



While *The Hoisting and Rigging Standard* is in itself a best practice document, much of its content, such as the OSHA and the therein prescribed ANSI/ASME and and Crane Manufacturers Association of America standards are mandatory within DOE. In addition, many DOE organizations have, on their own initiative, adopted the standard as mandatory to ensure safe and proper hoisting and rigging operations at their facilities.

# **Acknowledgment**

The Department of Energy (DOE) acknowledges the many organizations whose documents provided important source material for the standard. They include:

## **American Society of Mechanical Engineers**

- ASME B30.2, "Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)"
- ASME B30.5, "Crawler, Locomotive, and Truck Cranes"
- ASME B30.9, "Slings"
- ASME B30.10, "Hooks"
- ASME B30.16, "Overhead Hoists (Underhung)"
- ASME B30.17, "Overhead and Gantry Cranes (Top Running Bridge, Single Girder Underhung Hoist)"
- ASME B30.20, "Below-the-Hook Lifting Devices"
- ASME B30.21, "Manually Lever Operated Hoist"
- ASME B30.22, "Articulating Boom Cranes"
- ASME B30.23, "Personnel Lifting Systems"
- ASME B30.26, "Rigging Hardware"
- ANSI/ITSDF B56.1, "Low Lift and High Lift Trucks"
- ANSI/ITSDF B56.6, "Rough Terrain Forklift Trucks"
- ASME PALD, "Portable Automotive Lifting Devices"

## **Construction Safety Association (CSA) of Ontario**

"The Rigging Handbook"

## **Society of Automotive Engineers, Inc. (SAE)**

SAE J1028, "Mobile Crane Working Area Definitions"

Permission to reprint specific figures and illustrations was obtained from CSA and SAE. Applicable sections of 29 CFR 1910, "Occupational Safety and Health Standards for General Industry," and 29 CFR 1926, "Occupational Safety and Health Regulations for Construction," have been

paraphrased or reproduced verbatim throughout. The contribution of DOE's Hoisting and Rigging Committee, which has met annually since 1980, is also recognized. Representing many DOE sites, this group has provided their advice as to the tone and content of this standard. Without their time and talent, which has been provided gratuitously, there would be no standard.

The standard is a safety, not a design, document intended for use by safety professionals and managers. In keeping with this philosophy, only those portions of standards and regulations dealing with safety, particularly those deemed most relevant to DOE operations, have been included. In that the target audience for this document is safety professionals and managers and not hoisting and rigging equipment designers, the design references cited within Chapter 17 of this Standard (References) should be consulted for specific design, fabrication, and other performance criteria. While it is convenient to have focused, in-depth hoisting and rigging safety information concentrated into one document, the significance of the above source material is acknowledged, and readers are strongly encouraged to review each of them so as to have a full description of the subject area covered.

## Introduction

The U.S. Department of Energy (DOE) *Hoisting and Rigging Standard* is intended to be used by supervisors, line managers, safety personnel, equipment operators, and any other personnel responsible for safety of hoisting and rigging operations at DOE sites. The standard quotes verbatim or paraphrases (with minor editorial changes for consistency) the requirements of the U.S. Occupational Safety and Health Administration (OSHA) and the therein referenced standards of the American National Standards Institute (ANSI). It also encompasses, under one cover, applicable hoisting and rigging codes, standards, and regulations, eliminating the need to maintain extensive (and often incomplete) libraries of hoisting and rigging standards throughout DOE.

When formally invoked by contract, the use of the imperative voice (as in “Never use discarded load chain for slings”) or the word “shall” within this standard connotes a mandatory action, whereas use of the word “should” denotes a recommended action.

From chapter to chapter, the reader may notice what appears to be excessive repetition. Such repetition, however, is by design, enabling the use of each chapter, if needed or convenient, as a stand-alone document.

The standard occasionally goes beyond the minimum general industry standards established by OSHA and ANSI; and also delineates the more stringent provisions necessary to accomplish the extremely complex, diversified, critical, and oftentimes hazardous hoisting and rigging work found within the DOE complex. In doing so, it addresses the following items that are not covered in detail in the general industry standards:

1. Management responsibility and accountability
2. Operator/inspector training and qualification requirements
3. Definition of critical lifts and the additional requirements for making them
4. The need and responsibilities of a person-in-charge for critical lifts
5. The need and responsibilities of a designated leader for ordinary lifts
6. The definition and special requirements for preengineered production lifts
7. Special requirements for the testing, inspection, and maintenance of hoisting equipment in hostile environments
8. Nondestructive testing/nondestructive examination requirements for such items as hooks, welds, and spreader bars
9. Special requirements for inspection and load-testing of hoisting and rigging equipment/accessories
10. Hook latch requirements for cranes, slings, and rigging accessories
11. Design standards for such equipment as cranes, forklifts, and hooks

## DOE-STD-1090-2007

12. Operating practices for hoisting and rigging operations
13. Rigging information and load tables
14. Good and bad rigging practices.

Because the possibility of serious accidents resulting in personnel injury or death or significant property damage exists whenever hoisting and rigging take place, the requirements for these operations must be clearly defined and precautions ensured, including proper preplanning, extreme care, attention to detail, teamwork on the part of trained operators/riggers, and the use of equipment that is reliable, properly designed, inspected, and maintained. Although not mandatory at all DOE sites and locations, this standard has been used for many years by DOE and its contractors as a valuable resource for conducting hoisting and rigging safely and efficiently. It is felt that the full implementation of the provisions of this standard will dramatically strengthen hoisting and rigging programs throughout the DOE complex and will significantly decrease the probability of serious accidents resulting in personnel injury or death or severe property damage.

It should be noted that not all hoisting and rigging equipment or operational methods could be covered comprehensively by this standard. Hoisting and rigging equipment fabricated onsite or operated in manner not envisioned by this Standard shall be designed, constructed, operated, inspected and tested in accordance with the design engineer of record and applicable design standards. This Standard does not address elevators, drilling rigs, or the lifting loads with construction equipment not normally intended for lifting purposes (e.g., excavators, payloaders).

Also, this Standard does not repeat other DOE nuclear regulations, orders or standards (e.g., 10 CFR 830, "Nuclear Safety Management") with respect to safety analysis, technical safety requirements, or safety classifications of hoisting equipment. The applicable regulatory documents should be consulted to ensure conformance with these requirements during hoisting and rigging activities.

To propose improvements to this standard, please provide suggested text changes as well as supporting technical documentation to:

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