

Pamphlet 91

Checklist for Chlorine
Packaging Plants,
Chlorine Distributors, and
Tank Car Users of
Chlorine

Edition 4





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1. INTRODUCTION

1.1 <u>SCOPE</u>

This pamphlet is in a checklist format, and is designed primarily for use by chlorine packagers. However, by skipping irrelevant sections it can be used as a tool for chlorine distributors, sodium hypochlorite manufacturers, and chlorine tank car users to evaluate the chlorine handling part of their processes.

1.2 CHLORINE INSTITUTE STEWARDSHIP PROGRAM

The Chlorine Institute exists to support the chlor-alkali industry and serve the public by fostering continuous improvements to safety and the protection of human health and the environment connected with the production, distribution and use of chlorine, sodium and potassium hydroxides, and sodium hypochlorite; and the distribution and use of hydrogen chloride. This support extends to giving continued attention to the security of chlorine handling operations.

Chlorine Institute members are committed to adopting CI's safety and stewardship initiatives, including pamphlets, checklists, and incident sharing, that will assist members in achieving measurable improvement. For more information on the Institute's stewardship program, visit CI's website at www.chlorineinstitute.org.

1.3 GENERAL CONSIDERATIONS

It is intended that plant management use this form to survey their plant(s) and determine where current practices may need improvement, where training programs should be evaluated and where equipment may need to be added or upgraded.

Not all items included in this checklist are Chlorine Institute guidelines or legal requirements. Some are provided to make the user aware of options they may not have considered until now and may wish to incorporate in their operations(s). Appropriate Chlorine Institute pamphlets are listed in Section 3 to serve as a resource for finding CI guidelines on a particular subject.

This self-audit checklist is not intended to replace the need for familiarity with regulations by U.S. DOT, OSHA, U.S. EPA, or state or local requirements. Current Chlorine Institute pamphlets are also needed as a guide.

1.4 DISCLAIMER

The information contained in this pamphlet is drawn from sources believed to be reliable. The Institute and its members, jointly and severally, make no guarantee and assume no liability in connection with any of this information. Moreover, it should not be assumed that every acceptable procedure is included or that special circumstances may not warrant modified or additional procedures. The user should be aware that changing technology or regulations might require a change in the recommendations herein. Appropriate steps should be taken to insure that the information is current when used. These suggestions should not be confused with federal, state, provincial, municipal or insurance requirements, or with national fire, building or safety codes.

1.5 APPROVAL

The fourth edition of this document received its final review and approval by the Chlorine Institute's Health and Safety Issue Team on April 14, 2014.

1.6 REVISIONS

Suggestions for revisions should be directed to the Secretary of the Institute.

1.6.1 Significant Revisions in Current Edition

This revision clarifies statements and requirements from the previous edition and adds additional requirements from a security standpoint.

1.7 REPRODUCTION

The contents of this pamphlet are not to be copied for publication, in whole or in part, without prior Institute permission.

2. CHECKLIST

2.1 TRAINING PROGRAM

Α.	Is there a	written	nrogram	which	identifies.
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- 1. Subjects
- 2. Number and type of training sessions: classroom, hands on, etc.
- 3. Attendance: Who must complete the training; In-plant employees, drivers, carriers, etc.
- 4. Time frames: When training must be completed by each class of employee
- 5. Documentation: Signed attendance sheets, tests, required recordkeeping, etc.

B.	Does the program identify and/or provide for initial and refresher training
	for:

- 1. New employees
- 2. Existing employees
- 3. Trainers
- 4. Non-company personnel: contractors, carriers, etc.

C. Does the program provide training for:

- 1. Regulations
- 2. Operational Procedures and Emergency Operations
- 3. Supervised "hands-on" training
- 4. Kits and recovery vessel training

YES	NO

YES	NO

YES NO

YES	NO

D.	Does the program identify training requirements for:	YES	NO
	 Plant Employees Drivers Sales/Office Management Trainers 		
	6. Non-company personnel: contractors, carriers, etc.		
E.	Does the program identify personal protective equipment requirements including:	YES	NO
	 A written policy available that addresses chlorine operations: loading, unloading, emergencies, etc. Determination of proper gear from SDS with considerations for site-specific operations A documented PPE Hazard Assessment The inspection, cleaning, and maintenance of equipment The proper amount of on-site backup equipment Respirators, SCBA issues, etc. A documented respirator protection program Does personal protection meet CI recommendations for all chlorine processes (See CI Pamphlet 65 (3.1)) 		
F.	Does the program require routine safety meetings with defined:	YES	NO
	 Frequency Agendas Discussions of near misses and/or accidents 		
2.2	STORAGE (CYLINDERS AND CONTAINERS)		
A.	Is the storage area:	YES	NO
	 Clean, free of debris and combustible or incompatible materials Ventilated Maintained with clear aisles Properly identified: (signage, placards, labels, marked, etc.) Arranged to allow easy access to cylinders and both ends of ton containers Arranged to allow segregation from other chemicals Protected from in-plant traffic (forklifts, trucks, etc.) Does the facility have an Inventory Management Program for cylinders and ton containers for purposes of security 		

materials

В.	Is the storage area equipped with:	YES	NO
	 Strategically located safety showers, eye-wash stations and fire extinguishers 		
	Posted evacuation routes and marked emergency exits		
	Cylinder and ton container securing methods		
	Atmospheric monitoring equipment		
2.3	TRANSPORTATION AND HANDLING		
A.	Are cylinder(s) and ton containers:	YES	NO
	1. Moved utilizing carts, cages, or other suitable equipment		
	2. Re-inspected prior to shipment for:		
	 protective bonnets 		
	• leaks		
	 proper label /tags 		
	proper marking		
	3. Positioned to allow securement during handling		
	4. Secured to DOT regulations during transport using:		
	 chains, straps, and securing devices of adequate strength per DOT regulations (refer to CI Pamphlet 76 (3.1)) 		
	 chains, straps, and securing devices that are inspected and in good condition prior to use (refer to CI Pamphlet 76 (3.1)) 		
	5. Transported with fuse plug(s) in the vapor space		
	6. Transported with proper shipping descriptions on Bill of Lading		
	7. Transported using trucks/trailers maintained to DOT regulations		
	8. Inspected for damage, bonnets, tags, and valve caps when returned from customers		
	9. Serial numbers recorded during delivery and return from customers		
	10. Handled/transported per CI recommendations		
2.4	PACKAGING AREA		
A.	Does the packaging area have:	YES	NO
	 Atmospheric monitoring equipment calibrated on a routine basis per manufacturer's recommendations 		
	2. Wall charts, signage, SDS's, and other safety information		
	3. Clear aisles, marked emergency routes, and exits		
	4. Piping systems that are clearly identified, marked with flow direction		
	5. Emergency shutdown capabilities		
	Strategically located safety showers, eye-wash stations and fire extinguishers		
	7. Segregated areas for full and empty cylinders and ton containers		
	8. Clean areas, free of debris, and combustible or incompatible		

CHECKLIST FOR CHLORINE PACKAGING PLANTS, CHLORINE DISTRIBUTORS, AND TANK CAR USERS OF CHLORINE

B.	Are the following provisions carried out during the filling process as per CI recommendations:	YES	NO
	Filling gasket checked to be in good working condition		
	Cylinder and ton container checked to be in good condition		
	3. Cylinder and ton containers secured from movement during filling		
	4. Filling line evacuated before disconnecting cylinder or ton container		
	Full containers stored in such a way to allow easy access to the cylinder and both ends of the ton container		
	Ton containers lifted and handled with devices that meet Cl's recommendations		
	7. Full container kept onsite overnight and re-inspected prior to shipping for:		
	protective bonnets		
	leaks		
	 proper tag/label 		
	proper marking		
	Container valves inspected before refilling		
_	,		
C.	Are written procedures provided for:	YES	NO
	Receiving of returned containers		
	Inspection and preparation of returned containers		
	Inspection of container valve and torque requirements		
	Evacuation and filling of returned containers		
	5. Testing filling line connections for leaks prior to filling		
	Testing filling line for vacuum before disconnecting		
	7. Labeling and marking requirements		
	8. Training of employees on the written procedures		
2.5	PROCESS EQUIPMENT		
		YES	NO
Α.	Is the chlorine piping system:		
	1. Built to CI recommendations as per CI Pamphlet 6 (3.1)		
	2. Clearly identified, marked with flow direction		
	3. Adequately supported		
	Protected from vehicular traffic		
	5. Closed to moisture		
	Routinely inspected and maintained		
	7. Equipped with safety and emergency shutdown systems		
	8. Are all system components maintained in good working condition		

В.	Are expansion chambers:	YES	NO
	Properly sized based on your piping system		
	 Properly located Checked regularly to ensure rupture disc has not failed 		
	Routinely inspected and maintained		
	Treatment ineposited and maintained		
C.	Is the barometric loop:	YES	NO
	Installed to the proper height		
	Manufactured using compatible materials		
	3. Adequately supported		
	Routinely inspected and maintained		
D.	Is compressed air padding system:	YES	NO
	 Equipped with a dryer and filters to provide air with a dew point of -40° F or below 		
	2. Equipped with a system to prevent chlorine gas from flowing back into the air compressor		
	Manufactured using compatible materials		
	4. Routinely inspected and maintained5. Dedicated for unloading chlorine tank cars only		
	5. Dedicated for unloading chlorine tank cars only		
E.	Is the atmospheric monitoring equipment:	YES	NO
	Located to detect a release		
	Installed per manufacturer's recommendations and at the correct height		
	3. Designed to automatically alarm (audible/visible)		
	4. Designed to perform emergency shutdown operations		
	 Designed to perform emergency shutdown operations Inspected and maintained per manufacturer's recommendations 		
		VES	NO
F	5. Inspected and maintained per manufacturer's recommendations	YES	NO
F.		YES	NO
F. 2.6	5. Inspected and maintained per manufacturer's recommendations		
2.6	5. Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions BULK OPERATIONS	YES	NO NO
	 Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions 		
2.6	 5. Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions BULK OPERATIONS Do written operating procedures require: 1. Operator attendance and/or monitoring in accordance to regulatory 		
2.6	 Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions BULK OPERATIONS Do written operating procedures require: Operator attendance and/or monitoring in accordance to regulatory requirements 		
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2.6	 Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions <u>BULK OPERATIONS</u> Do written operating procedures require: Operator attendance and/or monitoring in accordance to regulatory requirements Emergency shutdown devices Lines capped immediately to prevent moisture from entering the piping system Piping systems purged prior to disconnection 		
2.6	 Inspected and maintained per manufacturer's recommendations Is a chlorine scrubber provided to capture fugitive emissions BULK OPERATIONS Do written operating procedures require: Operator attendance and/or monitoring in accordance to regulatory requirements Emergency shutdown devices Lines capped immediately to prevent moisture from entering the piping system 		

YES B. Are the following met: NO Adequate access and egress provided; work platforms, railing, etc. Proper lighting to allow safe and secure operations and emergency 2. response Proper connections used 3. Warning signs posted, warning lights utilized 4. Proper placards, labels, etc. 5. Brakes set, wheels chocked For railcars, locked switches and/or derails in place at least 50 feet from other cars 8. For cargo tanks, isolated process area Remote shutdown capabilities 9. 10. Motion detection/automatic shutdown capabilities C. Are inspections conducted and documented that provide for: YES NO 1. Receiving and releasing instructions Pre-loading/unloading instructions 2. Post-loading/unloading instructions 3. Verification that protective housing is closed and sealed and that no visible damage is found Verification that there is a regulatory program is in place to identify 5. regulatory requests and inspection requirements Seal numbers verified (shipped seal # vs. received) 6. Railcar stenciling and test data verified and documented prior to making physical connection(s) 2.7 **SECURITY** A. Has the company implemented a security plan that: YES NO 1. Addresses the applicable regulatory (DOT, TSA, DHS) requirements 2. Provides for security training; initial, refresher, etc. 3. Provides security procedures 5. Implements the applicable sections of the CI Chlorine Rail, Highway, and/or Barge Transportation Security Plan 2.8 **EMERGENCY PREPAREDNESS** A. Does the facility/company have an emergency plan that provides for: YES NO 1. Procedures to address regulatory agency reporting requirements 2. Evacuation procedures, emergency instructions, and community alert provisions 3. Written policy governing PPE 4. Training and instructions for facility neighbors 5. Internal and external emergency response provisions 6. Drills, exercises, and other planning events

7. Routine reviews and updates

	8	Response and mitigation procedures for a security incident involving a chemical of concern	YES	NO
	9.	Reporting of security incidents internally and externally in a timely manner and coordination procedures with local, state, and/or federal emergency groups		
В.	Do	es the company have a written policy that requires the:	YES	NO
	1. 2. 3. 4. 5. 6.	Reporting of all incidents, internal/external, near miss and actual incidents, injuries, fatalities, chemical releases etc. Investigation of, and documentation of, all incidents Review of investigation results with applicable employees Documentation of all findings Documentation of, and implementation of, a corrective action plan Maintenance of incident records		
C.	ls t	he facility:	YES	NO
	1.	Equipped with windsock(s), appropriately located where visible from all areas		
	2.	Equipped with or have readily available, the proper types of kits and/or recovery vessels		
	3.	Equipped with, or have readily available, the proper types of and number of SCBAs		
	4.	Equipped with emergency shutdown capabilities		
D.	Are	the chlorine emergency kits maintained in a state of readiness:	YES	NO
	1. 2.	Located in strategic places or at an acceptable offsite location Cleaned and inspected after each use or drill		
	3. 4.	Gaskets kept in good condition and replaced at correct time intervals Items inventoried, kits sealed and dated		
E.	Are	the SCBAs maintained in a state of readiness:	YES	NO
		Located in strategic places		
	2.	Cleaned and inspected after each use or drill Gaskets and other parts maintained in good working order		
	4.	SCBA positive pressure cylinders are kept full of air, and maintained within retest dates		
F.	Are	e drivers equipped with:	YES	NO
	1.	An emergency contact list including company, third party, and agency contacts		
		Emergency instructions		
	4.	Security instructions Personal protective gear, including respiratory protection		
	5.	Emergency kits for cargo tanks		

2.9 PRODUCT STEWARDSHIP/COMMUNITY OUTREACH PROGRAM

A. Does the company have a written policy that provides t

- Supplying/offering new and existing accounts with CI Pamphlet 65, Safety Data Sheet (SDS), Wall Charts, and other safety materials (3.1)
- 2. Conducting seminars where attendance is recorded, and topics are documented and maintained
- 3. Screening new accounts; inspections, discussions, surveys and other written correspondence
- 4. Outreach training; knowledge of chemical, regulatory awareness, etc.
- 5. Interaction with the LEPC or the local fire service

YES NO

2.10 REGULATORY REQUIREMENTS

A. Does the company have a method/system that:

- 1. Identifies applicable regulations
- 2. Provides for staying current with the regulations
- 3. Includes local requirements such as building and fire codes
- 4. Tracks and maintains compliance with these regulations
- 5. Uses an internal or third party auditing process

	YES	NO
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2.11 <u>INSPECTIONS</u>

A. Is there a written inspection program:

- 1. That defines inspections for all chlorine operations
- 2. Requires documentation to support compliance with the program including:
 - a. Emergency shutdown system testing and documentation
 - b. Flexible hoses materials and replacement criterion
 - c. Scrubber systems
- 3. Includes a Mechanical Integrity Program

YES	NO

3. REFERENCES

The following publications are specifically referenced or pertain to the topics addressed in CI Pamphlet 91. The latest editions of CI publications may be obtained at http://www.chlorineinstitute.org.

3.1 CHLORINE INSTITUTE PUBLICATIONS

Pamphlet, WC, & DVD#	<u>Title</u>		
1	Chlorine Basics, ed. 8; Pamphlet 1; The Chlorine Institute: Arlington, VA, 2014 .		
6	Piping Systems for Dry Chlorine, ed. 16; Pamphlet 6; The Chlorine Institute: Arlington, VA, 2013 .		
17	Packaging Plant Safety and Operational Guidelines, ed. 4, Rev. 2; Pamphlet 17; The Chlorine Institute: Arlington, VA, 2011 .		
60	Chlorine Pipelines, ed. 7; Pamphlet 60; The Chlorine Institute: Arlington, VA, 2013 .		
64	Emergency Response Plans for Chlor-Alkali, Sodium Hypochlorite, and Hydrogen Chloride Facilities, ed. 6, Rev. 1; Pamphlet 64; The Chlorine Institute: Arlington, VA, 2008 .		
65	Personal Protective Equipment for Chlor-Alkali Chemicals, ed. 5; Pamphlet 65; The Chlorine Institute: Arlington, VA, 2008 .		
66	Recommended Practices for Handling Chlorine Tank Cars, ed. 4, Rev. 1; Pamphlet 66; The Chlorine Institute: Arlington, VA, 2009 .		
73	Atmospheric Monitoring Equipment for Chlorine, ed. 7; Pamphlet 73; The Chlorine Institute: Arlington, VA, 2003 .		
74	Guidance on Complying with EPA Requirements Under the Clean Air Act by Estimating the Area Affected by a Chlorine Release, ed. 5, Pamphlet 74; The Chlorine Institute: Arlington, VA, 2012 .		
76	Guidelines for the Safe Motor Vehicular Transportation of Chlorine Cylinders and Ton Containers, ed. 5, Pamphlet 76; The Chlorine Institute: Arlington, VA, 2012 .		
P-DVD	Packager Training Program, P-DVD; The Chlorine Institute: Arlington, VA, 2001 .		
W-DVD	Chlorine Safety for Water and Wastewater Operators, W-DVD, The Chlorine Institute: Arlington, VA, 2009.		
WC-1	Wall Chart: Handling Chlorine Cylinders and Ton Containers, ed. 3, WC-1; The Chlorine Institute: Arlington, VA, 2011.		
WC-2	Wall Chart: <i>Handling Sodium Hypochlorite</i> , ed. 1, WC-2; The Chlorine Institute: Arlington, VA, 2010.		



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