
















ORNL Carbon Steel Open Head 5-Gallon Drum Specification

Press  to see Check List only.

Description	Stores Catalog Number	Packaging Filling Instructions
Drum, Carbon steel, open head, 5 gallon, 11 1/4 in. ID, UN 1A2/X 43/S ; UN 1A2/Y 1.2/100 , 0.7595 mm Nominal (22 gauge)	02-112-6210	ORNL-CHK-14 (for Hazmat use) or ORNL-PKG-02 (for Type A use)

Mfg. Details Per: ORNL Packaging Specifications
No. 100-1A2-0007
Issue Date: April 15, 1994
Revised Date: August 25, 2005

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Oak Ridge National Laboratory (ORNL)

Packaging Specifications

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REVISIONS

(as of November 1, 2002)

DATE	REVISION NUMBER	REVISION (S) MADE
11/5/2002	-0006	<p>¶2.8 added "See Attachment #1 ..."; QC Checklist added closing instruction requirement (made item #5 and re-numbered remaining items); ¶7.0 removed "Cullman, Alabama" from Greif Brothers location; ¶9.0 reworded so closing instructions are included in each shipment.; Appendix A-1 reworded first NOTE to "...DOE Headmark List..."</p>
8/25/2005	-0007	<p>Throughout the document - changed "ASTM A 366" to "ASTM A 1008 or A 568", changed "ANSI MH2-1997" to ANSI MH2-2004 (or most current)"</p> <p>¶1.0 Added "Drums should be stackable/nestable when closed." and removed reference to 15/16-gallon drum; ¶1.1 added "Each packaging ... Type A packaging."; ¶1.2 changed 15-gallon to 10-gallon; ¶2.0 added "§178.350 [except §178.350(b)]."; ¶2.1 changed second sentence to read "Fabricated in..."; ¶2.6 changed to "Gaskets shall be ... +158°F."; ¶2.8 added "All bolts ... this specification."; ¶2.10 added "dry film thickness (DFT)"; ¶2.12 changed "omitted" to "not required"; ¶3.0 added "and §173.465 ..."; ¶3.1 re-wrote entire section; ¶3.2 renamed and re-wrote; ¶3.3 added this section; ¶4.0 Removed first paragraph – re-worded entire Quality Assurance section (¶4.1, ¶4.2, ¶4.3, and added ¶4.4); QC Checklist changed "GUAGE TABLE" to "CARBON STEEL DRUM CONSTRUCTION VARIATIONS", added item 12 to checklist; ¶6.0 added "and Type A solids (forms 1, 2, and 3)"; ¶8.0 added "Each change ... original specification."; ¶9.0 changed "UN" to "DOT" in section title, removed "directly to ... address below." from A), added fax number to B), added items C) and D); added Table 1 and Table 2; Added Attachment #2.</p>

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1.0 GENERAL DESCRIPTION

Open Head (OH) Carbon Steel drum with welded seams, 2 or 3 rolling hoops, steel body, steel head, conventional (with seams) construction. Steel gauge and specific variations as specified in [Table 1](#) for 55, 30, 10, 5 gallon drum capacity. Drums should be stackable/nestable when closed.

1.1 United Nations Designation - UN 1A2 /X **/ S/ * [UN 1A2 /Y sg/ tp/ *]^{dm} [per 49 CFR, §178.503]

- dm** = Drum dual marked for liquids, as well as solid material.
- 1A2** = Open head steel drum.
- X** = Suitable for Packing Group I, II, and III materials; Y = PG II and III only.
- **** = Maximum allowable gross weight in kilograms for which the drum was tested .
- S** = Designation indicates packaging is for solid materials [or combination packaging].
- *** = The last two (2) digits of the calendar year in which the container was manufactured.
- sg** = Specific Gravity of material for which drum design type was tested.
- tp** = Hydrostatic test pressure (in kilopascals) for which drum design type was tested. [100 kPa = 14.7 psig; 250 kPa = 36.3 psig]

Specific UN Markings are specified in the Catalog Description for the referenced catalog number for each specific drum, which are the ORNL "minimum" UN requirements. Each packaging must meet all applicable requirements of subpart B of Part 173 of Title 49, Code of Federal Regulations (49 CFR) and be designed, constructed and tested so that it meets the requirements of §§173.403, 173.410, 173.412, 173.415 and 173.465 of 49 CFR for Type A packaging.

1.2 Size:

Inside diameter (in inches) [as specified in the Catalog Description for the referenced catalog number].

Drum dimensions to be in accordance with ANSI (American National Standards Institute) MH2-2004 (or most current) Standards for Steel Drums and Pails [does not apply to 10 and 5 gallon drums].

2.0 MATERIAL DETAIL

Drum construction must comply with 49 CFR §§178.504 and 178.350 [except §178.350(b)] (latest edition) for steel drums, and the following minimum requirements. Manufacturer shall document appropriate quality control on incoming raw material. No significant changes to the manufacturing process or raw material is allowed without prior approval of the Company. Steel thickness dimensions/tolerances in conformance with [Table 1](#) and [Table 2](#).

2.1 Drum Body:

Cold rolled steel, ASTM A 1008 or A 568 or equivalent. Manufactured in accordance with ANSI MH2-2004 or most current)--see [Table 1](#) for steel size for stated drum capacity.

2.2 Drum Head:

Cold rolled steel, ASTM A 1008 or A 568 or equivalent; see [Table 1](#) for steel size.

2.3 Drum Bottom:

Cold rolled steel, ASTM A 1008 or A 568 or equivalent; same steel as drum body.

2.4 Body Seams:

Welded (on-line, continuous welder).

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2.5 Chimes:

Mechanically seamed; bottom chime triple seamed, or either double-seamed or double-seamed *and* welded, if the double seam drum meets UN test criteria as specified.

2.6 Gasket:

Gaskets shall be closed-cell rubber per ASTM D1056. Gaskets shall be glued into the lid. Gasket material and size shall meet all UN performance tests.

Gaskets shall be manufactured from EPDM or, if approved by ORNL, alternate equivalent material may be used. Gasket shall have an operating temperature range of -40°F to +158°F.

2.7 Rolling Hoops:

Three (3) each separate rolling hoops formed into the drum body, with one not more than three (3) inches from top drum curl for 55-gallon capacity and larger. Two (each) rolling hoops for under 55-gallon capacity (5-gallon called beads). Rolling hoops to be in accordance with ANSI MH2-2004 (*or most current*) Standards.

2.8 Closure:

Twelve (12) gauge bolt type locking ring, welded lugs, one lug threaded, with steel bolt. Locking ring painted, coated, or galvanized to prevent corrosion. All bolts shall have one hole at the leading end of the threads perpendicular to the axis of the bolt. The hole shall be at least 1/8 inch diameter. This requirement shall apply to all drum sizes covered by this specification. See [Table 1](#) for minimum required bolt sizes. See [Attachment #1](#) for DOE Headmark List for counterfeit bolts.

Manufacturer/ supplier must furnish ORNL, in writing, closure requirements, as performed for the UN and Type A design test; per 49 CFR, §178.2(c)(1). It must be identified on the closure instructions specifically as to the ORNL drum to which the instructions apply. Ref. [19.0](#) for distribution.

2.9 Surface Preparation:

Surfaces shall be prepared to retard rust formation, or be sufficiently cleaned for application of interior and exterior coatings.

2.10 Interior Finish:

55 and 30 gal: Lined with 2/3 Epoxy, 1/3 Phenolic coating, 1 mil. (± 0.2) dry film thickness (DFT) [*or an equivalent material, after approval by ORNL Packaging Operations*]

5 and 10 gal: Lined with clear phenolic coating, 1/10 mil, or equal, for rust prevention.

2.11 Exterior Finish:

Body painted SSCI (Steel Shipping Container Institute) Black, with White head (*unless specified differently elsewhere*).

2.12 Seaming Compound:

Bottom chime must be sealed with a seaming compound, and applied in conformance to standard manufacturing quality procedures, to ensure no leakage/seepage. Seaming compound is not required for double seam/welded bottom chimes.

2.13 Cleanliness:

Finished drums must be free of rust, dirt, oil, solvents, metal shavings, foreign contaminates, and interior moisture.

3.0 CONTAINER PERFORMANCE CRITERIA

Manufacturer shall successfully test and certify that containers meet or exceed the requirements of 49 CFR, §§178.600 - 178.608, Packing Group I level for solids, Packing Group II level for liquids and §173.465, Type A requirements for solids [forms 1, 2 and 3].

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3.1 UN Performance Test Documentation:

The manufacturer shall provide copies of the performance test documentation for the purchased packaging, as required by 49 CFR §178.601(i) for the UN certification marked packaging. Documentation shall be furnished in accordance with [19.0](#) of this specification.

NOTE TO SELLER: The UN test/marketing certifications must be made by the drum manufacturer or a Department of Transportation approved third-party tester.

3.2 DOT 7A Type A Performance Tests:

All drums specified herein shall be tested and certified by the manufacturer or a Department of Transportation (DOT) approved third-party tester to be acceptable for use as DOT 7A Type A packages and that the drums shall meet or exceed performance certification and testing as established in 49 CFR §173.465.

If the drums being offered under this specification have already been tested to and passed the 7A certification requirements, this fact shall be noted in the offer along with the date of certification.

3.3 DOT 7A Type A Performance Test Documentation:

The manufacturer shall provide documentation of DOT 7A Type A testing as required by 49 CFR §173.465. Documentation shall be furnished in accordance with [19.0](#) of this specification.

In accordance with 49 CFR §178.601(i), the Manufacturer shall maintain documentation of all testing at their production facility and at the location where the performance testing was completed for as long as the drum is produced and for a period of two (2) years thereafter.

4.0 QUALITY ASSURANCE

The Seller shall meet the requirements stipulated in this document, and the specific requirements of the Catalog Description for the specific drum as specified in the Purchase Order.

4.1 Manufacturer's Quality Program:

The Fabricator/Seller shall have a Quality Manual that ensures full compliance with all requirements, tests, inspections, reports, documentation, and approvals contained in this specification.

The Fabricator/Seller shall provide a Certificate of Compliance/Conformance (CoC) traceable to the testing documentation and specific Purchase Order stating that the quality of the drums furnished under this specification are of good quality, as pursuant to industry standard manufacturing practices for steel drums, including the materials/components used in the manufacturing of the stated steel drums.

At a minimum, drums shall be designed and manufactured per the requirements of this specification and with the latest edition of 49 CFR §178.504, **Standards for Steel Drums**. In accordance with their Quality Manual, the Seller shall maintain and document the appropriate level of quality control on incoming raw material to be used for the manufacture of the drums procured under this specification.

ORNL reserves the right to witness fabrication efforts prior, during, and after final assembly of these drums. This right is extended to all subcontractors that the Seller uses.

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4.2 Manufacturer's Certification

By the act of placing the UN performance criteria markings on each drum purchased, the manufacturer acknowledges he has certified, and accepted responsibility, that the stated drum design meets or exceeds the U.S. Department of Transportation's UN performance requirements as stipulated in [§13.1](#) of this document, and in accordance with the markings prescribed in 49 CFR §178.503.

In addition, this certification marking acknowledges that the drum manufacturer has complied with the specific standards for steel drums specifically listed in 49 CFR §178.504.

The Manufacturer shall furnish certification that these UN rated drums have been tested and evaluated for compliance as DOT 7A Type A packaging in accordance with [§13.2](#) and [§13.3](#). The certification must be traceable to a specific drum.

The Seller shall furnish documentation showing that the construction methods, packaging design, and materials of construction comply with this specification. Only one (1) copy of the full documentation is required to be on file with the Company. If a design change such that re-testing is required, new complete documentation must be submitted. Each drum must be traceable to the testing and the Purchase Order.

A CoC shall be provided on Supplier letterhead and signed by an employee of the Supplier stating:

- 1) The drum is manufactured in accordance with this specification.
- 2) The Type A documentation is traceable to the Purchase Order and testing.

4.3 Receiver Inspections:

The following inspections will be performed on the incoming drums by receiver to determine the drums meet quality standards and the requirements of this document. However, the receiver is not limited to the following inspections to determine quality and specification conformance. Conformance will be indicated by a **Y** or **N** in the "**Y/N**" column, and negative responses documented on the Nonconformance Report (NCR), [ORNL-311](#), (items 1b - 16), attached to the checklist and submitted to ORNL's Packaging Operations (PkgOps) for necessary action.

NOTE: Checklist for this specification is on following page.

4.4 Authorized Changes

The Seller shall not deviate from the requirements of this specification without prior written authorization from ORNL Transportation and Packaging Management (TPM).

If a change or deviation from the requirements of this specification is desired, prior to any manufacturing, the Seller shall complete and submit a Deviation Request, ([ORNL-313](#)) per [Attachment #2](#) of this specification.

A signed approval of the Deviation Request shall be received by the Seller from ORNL TPM.

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This checklist is to be reproduced for QC Inspections.

Receiver Inspection Quality Control (QC) Checklist for Incoming Steel Drums

QC Conformance	Y/N	<<"No's" to be documented on form ORNL-311 , with checklist
1	Steel gauge size	Meets dimensions/tolerances per attached <i>Carbon Steel Drum Construction Variations</i> , Table 1 .
2	Capacity	Drum is the capacity specified in the Order/Catalog Description.
3	Drum Surface	Clean, no significant scratching, dings or dents in drum; no significant corrosion, on exterior and interior surface of drum.
4	Locking rings, chimes	Bolted locking rings are painted steel, contain bolt size (minimum) specified in Table 1 , and show no significant rusting /corrosion.
		Bolted locking rings close tightly; not loose around drum lid.
5	Closing Instructions	Closing Instructions are included with each shipment per §2.8 .
		Drums are able to be closed according to closing instructions.
6	Drum lids	Lids are painted WHITE; no significant rusting/corrosion or dents.
7	Gaskets in lids	Gaskets are securely glued into the drum lids.
8	Drum interior	Visually verify lined, including lids; Ref. §2.10 of this specification.
9	Drum exterior	Painted Black (SSCI {Steel Shipping Container Institute} standard), except lids, unless another color is specified elsewhere in the specific order.
10	Markings	Drums marked (as a minimum) with ORNL specified UN markings, per Catalog Description -- which include BOTH solid and liquid (dual) UN markings.
		Drums legibly marked (embossed) on drum bottom in accordance with required 49 CFR markings, and specified gross test weight. Permanent (embossed) markings are not required on bottoms of 5 and 10 gallon drums—required durable complete markings must be on bottom or side per 49 CFR, §178.503(a).
		Markings include the manufacturer's identification -- company name or registered symbol (initials or M-number), or test agency code; after USA/. Ref: 49 CFR, §178.503(a)(8).
11	Side Markings	The required UN markings (including the specified dual UN marks) are durably and legibly marked on side.
12	Documentation	Certificate of Compliance (CoC) is provided per §4.2 . Complete UN and type A test documentation provided, or on file, per §3.1 and §3.3 , respectively.

Catalog Number _____

P. O. Number _____

Total Units Received _____

Inspection Method: Per ORNL PkgOps QC Inspection Plan

Sample Size _____ [Based on ANSI/ASQC Z1.4-1993]

NCR No. _____

Inspector/Date _____

Additional comments on back: _____ check, if yes.

The above QC inspection check list shall be accomplished for each order based on random samples of incoming carbon steel drums by QC personnel to determine manufacturer's conformance to these specified Packaging Specifications.

Shipments of carbon steel drums not meeting specified requirements will be returned to the seller for credit.

QC inspections resulting in noncompliance with Packaging Specifications is cause for rejection of the entire shipment.

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5.0 MARKING

As a minimum, each drum shall be marked in accordance with 49 CFR, §§178.3, 178.502 and 178.503 in a conspicuous location on exterior surface of the drum. Duplicate markings must be on drum sides, just below top drum curl, to be in compliance with §178.3(a)(5). Markings shall have a minimum letter height of 2 inch. Markings must include the manufacturer's identification -- company name or registered symbol (initials or M-number) , or test agency code, per 49 CFR §178.503(a)(8).

Open Head Drums are to be UN dual marked (embossed) for both liquids and solid materials.

Additionally, drums are to be marked with the UN markings, including the specified dual markings, as stipulated in [§1.1](#) of this specification, and specifically stated in the Catalog Description.

The letters: CATN--(dash) plus the last four (4) numbers of the catalog number must be marked below the UN markings:

55 gal	=	CATN--6400
30 gal	=	CATN--6330
10 gal	=	CATN--6215
5 gal	=	CATN--6210

6.0 INTENDED USE

Containers are intended for Packing Group II and III hazardous materials in liquid form, PG I in **solid** form and Type A solids (forms 1, 2, and 3). Maximum fill capacity of the drum shall not exceed the tested gross weight or density marked.

7.0 SUGGESTED MANUFACTURERS

The following list of suggested manufacturers have demonstrated ability to comply to the requirements set forth in this document. However this list does not guarantee current or continued availability as a suggested manufacturer source:

- All-Pak, Inc., Columbus, Ohio
- General Steel Drum, Charlotte, North Carolina
- Greif Bros. Corp.
- Packaging for Industry, Knoxville, Tennessee
- Packaging Specialties, Cleveland, Ohio
- Skolnik Industries, Inc., Chicago, Illinois

The Seller must advise the Company prior to any change in the current source (manufacturer) of packaging materials described in these Packaging Specifications.

Any Manufacturer that satisfactorily demonstrates to the Company the capability to furnish packaging in compliance with these Packaging Specifications, may be added to the above listing.

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8.0 AUTHORIZED CHANGES

Changes/revisions in the requirements specified in this document will only be authorized by ORNL PkgOps as coordinated with Oak Ridge facilities packaging operations. Each change must have the same level of review as the original specification.

9.0 DISTRIBUTION OF DOT PERFORMANCE TEST REPORTS (per [13.1](#) and [13.3](#)) and CLOSURE INSTRUCTIONS (per [12.8](#))

- A) Closure Instructions must be furnished with each order for each type/size package purchased by ORNL.
- B) Upon each specific request, UN performance test documentation for specified order/shipment will be submitted directly to the Packaging Operations Manager at the address, or fax number, below.

**Oak Ridge National Laboratory
Packaging Operations Manager
Bldg.7001, MS 6288
P.O. Box 2008, 1 Bethel Valley Road
Oak Ridge, Tennessee 37831-6288
(865) 574-7098 [fax]**

- C) Current complete Type A test documents must be supplied with the order, or on file at the Company for each design.
- D) Certificate of Compliance/Conformance (CoC) shall be provided as described in [14.1](#).

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TABLE 1

CARBON STEEL OPEN HEAD (CS OH) DRUM [Fully Removable Head] CONSTRUCTION VARIATIONS

<i>ORNL-100-1A2-xxxx</i>				
Construction	55 gallon	30 gallon	10 gallon	5 gallon
Nominal, mm Steel Thickness * .	1.5189 .0598 in.	1.2141 .0478 in.	0.9119 .0359 in.	0.7595 .0299 in.
Drum gauge	16 ga.	18 ga.	20 ga.	22 ga.
Head Thickness Same Tolerances .	1.5189 16 ga.	1.2141 18 ga.	0.9119 20 ga.	0.7595 22 ga.
Rolling Hoops	3 each	2 each	2 each	2 each
Locking Ring –mm Nominal .	2.6568 12 ga.	2.6568 12 ga.	2.3241 13 ga.	2.6568 12 ga.
Bolt Size see note below **	5/8 in.	5/8 in.	5/8 in.	5/8 in.
Gaskets (glued in lid)	Required	Required	Required	Required
Interior Lining [Ref: ¶2.10]	Epoxy/Phenolic	Epoxy/Phenolic	Clear Phenolic	Clear Phenolic

* NOTE: Steel thickness are converted from the DOT Gauge Table, CFR 49, §173.24, pre HM-181 docket. [inches x 25.400 – millimeters; current CFR 49, §171.10(c)(2)]

** NOTE: Counterfeit bolts, as stipulated on current DOE Headmark List (See [Attachment #1](#)), will not be accepted. Bolts are of foreign origin.

. NOTE: Acceptable steel thickness tolerances, as shown above, are shown in [Table 2](#).

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TABLE 2

Thickness Tolerances for Cold-Reduced
Steel Sheet, for Coils¹⁾ and Cut Lengths

Values in millimeters

Specified Width b	Thickness tolerance ²⁾ for specified thickness, e				
	$0.4 < e \leq 0.6$	$0.6 < e \leq 0.8$	$0.8 < e < 1.0$	$1.0 < e \leq 1.2$	$1.2 < e \leq 1.6$
$600 < b \leq 1,200$	± 0.05	± 0.07	± 0.08	± 0.09	± 0.11
$1,200 < b \leq 1,500$	± 0.06	± 0.08	± 0.09	± 0.10	± 0.12

- 1) The thickness tolerances for sheets in coil form are the same as for sheets supplied in cut lengths, but in cases where welds are present, the tolerances shall be double those given over a length of 15 mm in the vicinity of the weld.
- 2) Thickness is measured at any point on the sheet not less than 25 mm from a side edge. (Values to b taken nearer than 25 mm are subject to negotiation between the purchaser and supplier.)

Source: ISO-3574-1986 *Cold-reduced carbon steel sheet of commercial and drawing qualities*

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ATTACHMENT #1

DOE Headmark List

ANY BOLT ON THIS LIST SHOULD BE TREATED AS DEFECTIVE WITHOUT FURTHER TESTING.



ALL GRADE 5 AND GRADE 8 FASTENERS OF FOREIGN ORIGIN WHICH DO NOT BEAR ANY MANUFACTURERS' HEADMARKS:



GRADE 5



GRADE 8

GRADE 5 FASTENERS WITH THE FOLLOWING MANUFACTURERS' HEADMARKS:

<u>MARK</u>	<u>MANUFACTURER</u>	<u>MARK</u>	<u>MANUFACTURER</u>
	J Jinn Her (TW)		KS Kosaka Kogyo (JP)

GRADE 8 FASTENERS WITH THE FOLLOWING MANUFACTURERS' HEADMARKS:

<u>MARK</u>	<u>MANUFACTURER</u>	<u>MARK</u>	<u>MANUFACTURER</u>
	A Asahi Mfg (JP)		KS Kosaka Kogyo (JP)
	NF Nippon Fasteners (JP)		RT Takai Ltd (JP)
	H Hinomoto Metal (JP)		FM Fastener Co of Japan (JP)
	M Minamida Sleybo (JP)		KY Kyoel Mfg (JP)
	MS Minato Kogyo (JP)		J Jinn Her (TW)
	Hollow Triangle Infasca (CA TW JP YU) (Greater than 1/2 inch dia.)		
	E Dalal (JP)		UNV Unytite (JP)

GRADE 8.2 FASTENERS WITH THE FOLLOWING HEADMARKS:

<u>MARK</u>	<u>MANUFACTURER</u>
	KS Kosaka Kogyo (JP)

GRADE A325 FASTENERS (BENNETT DENVER TARGET ONLY) WITH THE FOLLOWING HEADMARKS:

<u>MARK</u>	<u>MANUFACTURER</u>
Type 1	A325 KS Kosaka Kogyo (JP)
Type 2	
Type 3	

Key: CA-Canada, JP-Japan, TW-Taiwan, YU-Yugoslavia

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ATTACHMENT #2 (page 1)

DEVIATION FORM

1. DEVIATION NO: DR-		2. DIVISION:		
3. PROJECT TITLE:		4. PROGRAM:		
5. ITEM/ACTIVITY NAME:		6. SPECIFICATION/PROCEDURE:		
7. DRAWING NO:	8. SHOP ORDER:	9. WORK/PURCHASE:		
10. Description of Deviation				
11. Justification and Limitations				
12. Requested by:		13. Title:	14. Date:	
15. Drawing/Document is to be revised <input type="checkbox"/> NO <input type="checkbox"/> YES (if yes, list):				
Approved by: As Appropriate	16. Task Leader:	Date:	19. Item User:	Date:
	17. Requirement Originator:	Date:	20. Other:	Date:
	18. QA Group	Date:	20. Other:	Date:

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ATTACHMENT #2 (Page 2)

Continuation Page

DEVIATION NO: DR-	PAGE _____ OF _____
10. Description of Deviation	
11. Justification and Limitations	