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**DEPARTMENT OF DEFENSE
STANDARD PRACTICE FOR
ENGINEERING DRAWING PRACTICES**



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FOREWORD

1. This Department of Defense Standard is approved for use by all Departments and Agencies of the Department of Defense (DoD).
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: AMSTA-AR-EDE-S, Picatinny Arsenal, NJ 07806-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
3. This Department of Defense Standard provides:
 - a. Standard practices for the preparation of engineering drawings, drawing format and media for delivery.
 - b. Requirements for drawings derived from or maintained by Computer Aided Design (CAD).
 - c. Definitions and examples of types of engineering drawings to be prepared for the DoD.
 - d. Procedures for the creation of titles for engineering drawings.
 - e. Numbering, coding and identification procedures for engineering drawings, associated lists and documents referenced on these engineering drawings and associated lists.
 - f. Locations for Marking on engineering drawings.
 - g. Methods for revision of engineering drawings and methods for recording of such revisions.
 - h. Requirements for preparation of associated lists.
4. The policy of the DoD is to utilize to the maximum degree possible those non-Government standards which satisfy the needs of the military. Accordingly, this standard will be revised periodically to take advantage of those non-Government standards which meet the DoD criterion for technical sufficiency. Similarly, and in keeping with the DoD practice of adopting non-Government standards whenever practicable, Chapters 200, 600 and 700, as contained herein are now based on ASME Y14.24M, ASME Y14.35M and ASME Y14.34M

respectively. An accurate perception of DoD Engineering Drawing Practices then necessitates user recognition of MIL-STD-100F, ASME Y14.24M, ASME Y14.34M, and ASME Y14.35M as being a composite set.

5. Fundamental to the current content and maintenance of MIL-STD-100 is the existence of the DOD/Industry Drawing Practices Group (DRPRG). The DRPRG is chartered under the Defense Standardization Program as a cooperative effort between DOD and Industry directed toward codifying and standardizing engineering documentation practices, promoting applicable non-Government standards, and fostering liaison between industry associations and Government agencies. The DRPRG addresses the entire range of issues from the current status and needed changes to MIL-STD-100, to electronic data storage and transmission, and the ongoing requirement for compatibility with initiatives associated with Continuous Acquisition and Life Cycle Support (CALS) initiatives.

6. The DRPRG is chaired by the DOD Lead Standardization Activity (LSA) for DRPR and is co-chaired by an industry association member. The Office of the Assistant Secretary of Defense for Production and Logistics provides management oversight through its representative who serves as Executive Liaison. The DRPRG meets three or four times a year to address issues brought before it. For more information on the DRPRG and its proceedings please contact the DRPR LSA, located at the address indicated above for beneficial comments.

CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
1.	SCOPE	1
1.1	Scope	1
2.	APPLICABLE DOCUMENTS	2
2.1	Government documents	2
2.1.1	Specifications, standards, and handbooks	2
2.1.2	Other Government documents, drawings and publications	5
2.2	Non-Government publications	6
2.3	Order of precedence	10
3.	DEFINITIONS	11
3.1	Acronyms and abbreviations used in this standard	11
3.2	Acceptance	14
3.3	Adopted items	14
3.4	Altered item	14
3.5	Approved item name	14
3.6	Artwork master	14
3.7	Assembly	14
3.7.1	Inseparable assembly	14
3.8	Associated list	14
3.9	Bulk items	14
3.10	Chemical Agent Resistant Coating (CARC)	15
3.11	Code identification	15
3.12	Combination of items	15
3.13	Commercial and Government Entity (CAGE) Code	15
3.14	Commercial item	15
3.15	Contract	15
3.16	Contracting activity	16
3.17	Contractor	16
3.18	Copy	16
3.19	Critical safety characteristic	16
3.20	Critical safety item (CSI)	16
3.21	Current design activity (CDA)	16
3.22	Department of Defense Index of Specifications and Standards (DoDISS)	16
3.23	Design activity	16

<u>PARAGRAPH</u>	<u>PAGE</u>	
3.24	Digital data	17
3.25	Distribution statement	17
3.26	Document	17
3.27	Drawing (engineering)	17
3.28	Drawing format	17
3.29	Duplicate original	17
3.30	End-product (end-item)	17
3.31	Engineering data	17
3.32	Federal Supply Code for Manufacturers (FSCM)	17
3.33	Find number or item number	17
3.34	Firmware	17
3.35	Government design activity (GDA)	18
3.36	Group	18
3.37	Initial Graphics Exchange Specification (IGES)	18
3.38	Interchangeable item	18
3.39	Interface characteristic	18
3.40	Item	18
3.41	Item identification	18
3.42	Manufacturer	18
3.43	Master drawing	18
3.44	Matched parts	19
3.45	Nationally recognized standard	19
3.46	National Stock Number (NSN)	19
3.47	Non-Government standard (or document)	19
3.48	Non-part drawing	19
3.49	Nuclear effects	19
3.50	Nuclear Hardness Critical Item (HCI)	19
3.51	Nuclear Hardness Critical Process (HCP)	20
3.52	Observable Critical Item (OCI)	20
3.53	Observable Critical Process (OCP)	20
3.54	Original	20
3.55	Original date	20
3.56	Original design activity (ODA)	20
3.57	Part	20
3.58	Part or Identifying Number (PIN)	21
3.59	Procuring activity	21
3.60	Product	21
3.61	Product definition data	21
3.62	Production master	21
3.63	Qualification	21

<u>PARAGRAPH</u>		<u>PAGE</u>
3.64	Quality assurance	21
3.65	Quality assurance provisions (QAPs)	22
3.66	Referenced documents	22
3.67	Repair parts	22
3.68	Repairable	22
3.69	Replacement drawing	22
3.70	Revision	22
3.71	Revision authorization	22
3.72	Selected item	22
3.73	Set	22
3.74	Specialized segment of industry	22
3.75	Specification	23
3.76	Standard	23
3.77	Standardization document	23
3.78	Standard, company	23
3.79	Standard, military	23
3.80	Subassembly	23
3.81	Supplier	23
3.82	Symmetrically opposite parts	23
3.83	System (general)	24
3.84	Unit	24
3.85	Vendor	24

<u>PARAGRAPH</u>		<u>PAGE</u>
4.	GENERAL REQUIREMENTS	25
4.1	Coverage	25
4.1.1	Reference to this standard	25
5.	DETAILED REQUIREMENTS	26
5.1	Applicability	26
6.	NOTES	27
6.1	Intended use	27
6.1.1	Applicability	27
6.2	Acquisition requirements	27
6.2.1	Issue of DoDISS	27
6.2.2	Tailoring guidance Tailoring	27
6.3	International agreements	33
6.3.1	Air Standardization Coordinating Committee (ASCC), Air Standards (AIR STDs)	33
6.3.2	American, British, Canadian, Australian (ABC) Army Standardization Program, Quadripartite Standardization Agreements (QSTAGs)	33
6.4	Drawing ownership and drawing identification	35
6.4.1	Drawing identification	35
6.4.2	Design activity, current or original	35
6.4.3	Drawing ownership	35
6.5	Ozone depleting chemicals	35
6.6	Subject term (key word) listing	36
6.7	Changes from previous issue	36
CHAPTER 100	PREPARATION OF ENGINEERING DRAWINGS	
100.	General	100-1
101.	Basic practices	100-1
101.1	Size and format of engineering drawings	100-1
101.1.1	Metric	100-1
101.1.2	Decimal-inch	100-1
101.1.3	Application data	100-1
101.2	Line conventions and lettering	100-1
101.3	Single, multiple and sectional view drawings	100-1
1101.3.1	Isometric and pictorial views	100-1
101.3.2	Projection systems	100-1

<u>PARAGRAPH</u>		<u>PAGE</u>
101.4	Metric values	100-2
101.4.1	Metric designs	100-2
101.5	Dimensioning and tolerancing	100-2
101.5.1	Application	100-2
101.5.2	Knurling dimensioning	100-2
101.6	Surface texture	100-2
101.6.1	Surface texture symbols	100-2
101.7	Screw thread representation	100-2
101.8	Gears	100-2
101.9	Mechanical springs	100-2
101.10	Optical elements and optical systems	100-2
101.11	Castings and forgings	100-2
101.12	Graphic symbols, designations, letter symbols and abbreviations	100-2
101.12.1	Graphic symbols	100-3
101.12.2	Graphic symbols for electrical and electronics diagrams	100-3
101.12.3	Graphic symbols for logic functions	100-3
101.12.4	Graphic symbols for flowchart diagrams	100-3
101.12.5	Graphic symbols for fluidic power diagrams	100-3
101.12.6	Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction	100-3
101.12.7	Graphic symbols for plumbing fixtures	100-3
101.12.8	Graphic symbols for aircraft hydraulic and pneumatic systems	100-3
101.12.9	Ship structural symbols	100-3
101.12.10	Welding symbols	100-3
101.12.11	Nondestructive testing symbols	100-4
101.12.12	Graphic symbols for fluid power diagrams	100-4
101.12.13	Reference designations for electrical and electronic parts and equipment	100-4
101.12.14	Letter symbols	100-4
101.12.15	Mathematical signs and symbols	100-4
01.12.16	Abbreviations	100-4
101.13	Diagrams	100-4
101.13.1	Electrical and electronics diagrams	100-4
101.13.1.1	Logic circuit diagrams	100-4
101.13.2	Printed board drawings	100-4
101.13.3	Printed board description in digital form	100-4

<u>PARAGRAPH</u>	<u>PAGE</u>
101.14	Data preparation, maintenance, delivery, or access 100-4
101.14.1	Materials 100-4
101.14.1.1	Plastic sheet or roll 100-4
101.14.1.2	Paper, tracing 100-5
101.14.1.3	Film, Diazotype 100-5
101.14.1.4	Paper, Diazotype 100-5
101.14.2	Digital data 100-5
101.14.2.1	Plotters 100-5
101.14.2.2	Maintenance 100-5
101.14.2.3	Associated lists, materials 100-5
101.14.2.4	Physical media 100-5
101.14.2.5	Initial Graphics Exchange Specification (IGES) 100-5
101.14.2.6	Raster data files 100-5
101.14.2.7	Standardized General Markup Language (SGML) 100-5
101.14.3	Preparation of duplicate original 100-6
101.15	Scale 100-6
101.15.1	Selection of scale 100-6
101.15.2	Indication of scale 100-6
101.15.3	Drawings not to scale 100-6
101.16	Drawing marking for item identification 100-6
101.16.1	Drawing requirements for part identification marking 100-6
101.16.1.1	Identification marking location and size 100-6
101.16.1.2	Tags and plates 100-7
101.16.1.3	Packaged items 100-7
101.16.1.4	Altered, selected, or source control item identification 100-7
101.16.1.5	Printed board assemblies 100-7
101.17	Optional/alternative designs 100-7
101.18	Drawing notes 100-7
101.18.1	Language 100-8
101.18.1.1	Language style 100-8
101.18.2	Commonly used words and phrases 100-8
101.18.3	Use of "shall", "will", "should" and "may" 100-8
101.18.4	Indefinite terms 100-9
101.18.5	Location of notes 100-9
101.18.5.1	Associated lists and drawings in book-form 100-9
101.18.6	Drawing notes, contents 100-9
101.19	Drawing verification and approval 100-11

<u>PARAGRAPH</u>		<u>PAGE</u>
101.20	Dating drawings	100-11
101.21	Reference identifiers	100-11
101.22	In-house peculiar information	100-12
101.23	Use of Government and non-Government standardization documents	100-12
101.24	Code Identification, FSCM and CAGE Code	100-12
CHAPTER 200	TYPES OF ENGINEERING DRAWINGS	200-1
200.	General	200-1
201.	Associated lists	200-1
202.	Methods and styles	200-1
202.1	Tabulation	200-1
202.1.1	Tabulation requirements	200-1
202.2	Drawings in book-form	200-1
202.2.1	Book-form requirements and limitations	200-1
202.3	Combination of drawing types	200-2
202.3.1	Application	200-2
203.	Pictorial drawings	200-2
204.	Drawing types	200-2
204.1	Industry standard	200-2
204.2	Government specific	200-4
204.2.1	Inseparable assembly drawing	200-4
204.2.1.1	Inseparable assembly drawing requirements	200-4
204.2.2	Envelope drawing	200-4
204.2.3	Standardized microcircuit drawing (SMD)	200-5
204.2.3.1	SMD requirement	200-5
204.2.3.2	SMD limitation	200-5
204.2.4	Combination of adopted items drawing	200-5
204.2.4.1	Combination of adopted items drawing requirements	200-5
204.2.5	Package content drawing	200-6
204.2.5.1	Package content drawing requirements	200-6
204.2.6	Software and firmware data	200-7
204.2.6.1	Memory device categories	200-7
204.2.6.2	Software installation drawing	200-7
204.2.6.2.1	Application	200-7
204.2.6.2.2	Software installation drawing requirements	200-7
204.2.6.3	Assemblies containing multi-programmable devices	200-8

<u>PARAGRAPH</u>		<u>PAGE</u>
204.2.6.4	Altered item drawing (one-time programmable devices and multi-programmable devices used as one time programmable)	200-8
204.2.6.4.1	Altered item drawing (one-time programmable devices and media) requirements	200-8
204.2.7	Camouflage basis drawing	200-8
204.2.7.1	Camouflage basis drawing requirements	200-9
204.2.8	Camouflage pattern drawing	200-10
204.2.8.1	Camouflage pattern drawing requirements	200-10
204.2.9	Transportability drawing	200-10
CHAPTER 300	DRAWING TITLES	300-1
300.	General	300-1
301.	Drawing title	300-1
301.1	Approved item names	300-1
301.2	Type designators	300-1
301.3	Assembly	300-1
302.	Procedures for creating drawing titles	300-1
302.1	General rules	300-2
302.2	First part of title	300-2
302.3	Second part of title	300-6
303.	Disclosure of security categories	300-6
CHAPTER 400	NUMBERING, CODING AND IDENTIFICATION	400-1
400.	General	400-1
401.	Commercial and Government Entity Code (CAGE Code)	400-1
402.	Drawing number	400-1
403.	Drawing identification	400-1
404.	Part or identifying number	400-1
405.	Find number	400-2
406.	Identification requirements	400-2
406.1	New drawings and associated lists	400-2
406.2	Existing drawings and associated lists	400-2
406.3	Referenced documents	400-2
406.4	CAGE Code	400-2
406.5	Drawing number structure	400-3
406.6	PIN length and application	400-5
406.7	Records	400-5
406.8	Associated lists	400-5

<u>PARAGRAPH</u>		<u>PAGE</u>
406.9	Transferring design responsibility to another activity	400-5
406.9.1	Maintaining design activity identities	400-6
406.10	Item identification and PIN	400-7
406.10.1	Identification cross reference	400-7
406.11	References to items	400-8
406.11.1	Vendor item control and source control notations	400-8
406.11.2	CAGE Code as a Prefix	400-8
406.12	Numbering of related parts	400-9
406.12.1	Matched part designation	400-9
406.12.2	Symmetrically opposite (mirrored) parts	400-9
406.12.3	Inseparable assembly	400-9
406.13	Change requiring new identification	400-9
406.13.1	Computer program	400-10
406.14	Changes not requiring new identification	400-10
406.15	Identification of materials, processes and protective treatment	400-10
406.15.1	Group identification	400-11
406.15.2	Other identification	400-11
406.15.3	Formulation identification	400-11
406.15.4	Bulk items identification	400-11
406.15.4.1	Drawings for bulk items	400-11
CHAPTER 500	MARKINGS ON ENGINEERING DRAWINGS	500-1
500.	General	500-1
501.	Items and processes, special notations	500-1
501.1	Marking for special items and processes	500-1
501.2	Feature identification	500-1
501.3	Symbology	500-1
501.3.1	Established symbology	500-1
501.3.2	Symbology without established references	500-1
501.4	Notes	500-2
501.5	Exceptions to boxed symbols	500-2
501.6	Specialized notes	500-2
501.6.1	Hardness critical note	500-2
501.6.2	Ozone depleting chemicals note	500-2
502.	Item replacement notations	500-2
502.1	Interchangeable items	500-2
502.2	Non-interchangeable items	500-3

<u>PARAGRAPH</u>		<u>PAGE</u>
502.3	Drawings of multiple items	500-3
502.4	Superseded drawings	500-3
503.	Identifying substitute parts	500-3
504.	Security classification and notation	500-3
505.	Rights in data legends on drawings	500-3
506.	Duplicate original	500-4
507.	Duplicate production master (stable base artwork)	500-4
508.	CAD reproductions	500-4
509.	Reproductions from digitally maintained data	500-4
510.	Drawing copies derived from exchanged digital data	500-4
CHAPTER 600	REVISION OF ENGINEERING DRAWINGS	600-1
600.	General	600-1
601.	Revision methods requirements	600-1
602.	Drawing practices	600-1
603.	Revision symbols	600-1
604.	Required revisions	600-1
604.1	Changes not requiring revision level advance	600-1
605.	Recording revisions on drawings	600-1
605.1	Approval	600-1
605.2	Revision date	600-2
605.3	Continuing the recording of revisions	600-2
605.4	Revision history retention	600-2
605.4.1	Removal of revision history	600-2
605.5	Revision of multi-sheet drawings	600-2
606.	Revisions to production master drawings	600-2
607.	Redrawn drawings	600-4
607.1	Redrawn with or without change	600-4
608.	Drawing supersession	600-4
608.1	Superseded (old) drawing, same number	600-4
CHAPTER 700	ASSOCIATED LISTS	700-1
700.	General	700-1
701.	Parts list (PL)	700-1
702.	Data list (DL)	700-1
703.	Index list (IL)	700-1
704.	General requirements (associated lists)	700-1
704.1	List preparation	700-1

<u>PARAGRAPH</u>		<u>PAGE</u>
704.1.1	Lists prepared from digital data	700-1
704.1.1.1	Revision of digital data prepared lists	700-2
704.1.2	Revision of manually prepared lists	700-2
704.2	Multiple sheets	700-2
704.2.1	Sheet numbering	700-2
704.3	Reproducibility requirements	700-2
704.4	Revision identification	700-2
704.5	Deleting items	700-2
704.6	Adding items	700-2
704.7	Revision description	700-3
704.8	Design activity identification	700-3
704.9	Block and column size and arrangement	700-3
704.10	Additional blocks and columns	700-3
704.11	Authentication, parts, data, and index lists	700-3
705.	PL preparation	700-3
705.1	PL Format	700-3
705.2	PL requirement	700-3
705.3	Separate PLs	700-3
705.3.1	PL identification	700-3
705.3.2	Manual preparation	700-3
705.4	PL entries	700-4
705.4.1	Substitute parts or bulk items	700-4
705.4.2	Column 10, quantity required (mandatory)	700-4
705.4.3	Column 11, CAGE code (mandatory)	700-4
705.4.4	Column 12, part or identifying number (PIN) (mandatory)	700-4
705.4.5	Column 14, drawing or (procurement) document number column (mandatory)	700-5
705.4.6	Supplemental list column (optional)	700-5
706.	DL preparation	700-5
706.1	DL format	700-5
706.2	DL organization	700-6
706.2.1	Sequence of documents	700-6
706.3	DL entries	700-6
707.	IL preparation	700-6
707.1	IL format	700-6
707.2	Sequence	700-6
707.3	IL entries	700-7
708.	Revision history block on lists	700-7

<u>PARAGRAPH</u>		<u>PAGE</u>
APPENDIX A	SIGNING AND INITIALING DRAWINGS	A-1
10.	General	A-1
10.1	Scope	A-1
20.	Applicable documents	A-1
30.	Definitions	A-1
40.	General requirements	A-1
40.1	Manually prepared drawings	A-1
40.2	Computer generated drawings	A-1
40.3	Initial and signature blocks	A-1
40.3.1	Signatures and initials authority	A-2
40.3.2	Approval of computer generated drawings	A-2
40.3.2.1	Aperture card signature and revision history block	A-2
40.4	Associated lists	A-2
APPENDIX B	SECURITY CLASSIFICATION MARKINGS AND NOTATIONS	B-1
10.	General	B-1
10.1	Scope	B-1
20.	Applicable documents	B-1
20.1	Government documents	B-1
20.1.1	Other Government documents	B-1
30.	Definitions	B-1
40.	General requirements	B-1
40.1	Security classifications and notations	B-1
40.1.1	Assigning classification	B-1
40.1.2	Application of security classification	B-1
40.1.3	Size of security markings	B-2
40.1.4	Color of security markings	B-2
40.1.5	Location of security markings on drawings	B-3
40.1.5.1	Security markings on roll size drawings	B-3
40.1.6	Location of security markings on associated lists	B-5
40.1.7	Location of security markings on drawings in book-form	B-7
40.1.8	Regrading classification	B-8

<u>PARAGRAPH</u>		<u>PAGE</u>
APPENDIX C	QUALITY ASSURANCE PROVISIONS	
10.	General	C-1
10.1	Scope	C-1
10.2	Application	C-1
20.	Applicable documents	C-1
20.1	Government documents	C-1
30.	Definitions	C-1
40.	General requirements	C-1
40.1	QAPs, general	C-1
40.2	Responsibility for inspection	C-1
40.3	Contractual and administrative requirements	C-2
40.4	Drawings requiring QAPs	C-2
40.4.1	QAP preparation	C-2
40.5	Methods of inspection	C-2
40.5.1	Grouping of quality conformance inspections	C-3
40.6	Toxicological products	C-3
40.7	Classification of characteristics	C-3
40.8	Sampling for quality conformance inspection	C-3
40.9	Specifying characteristics	C-3
40.10	QAP notes on drawings	C-4
40.10.1	Compliance with specifications	C-4
40.10.2	Method of inspection	C-6
40.11	Unspecified characteristics	C-6
APPENDIX D	QUALIFICATION PROVISIONS FOR SOURCE	
	CONTROL DRAWINGS	D-1
10.	General	D-1
10.1	Scope	D-1
20.	Applicable documents	D-1
30.	Definitions	D-1
30.1	Qualification	D-1
30.2	Small business	D-1
30.3	Source control drawing	D-1
30.4	Source of supply	D-1
30.5	Testing laboratory	D-1
40.	General requirements	D-2
40.1	Purpose	D-2
40.2	Intent	D-2
40.3	Government source control drawings	D-2

<u>PARAGRAPH</u>	<u>PAGE</u>	
40.4	Qualification focal point	D-2
40.5	Multiple sources of supply	D-3
40.5.1	Existing drawings	D-3
40.6	Significance	D-3
40.7	Manufacturer's obligation	D-3
40.8	Government obligations	D-3
40.8.1	Approved sources of supply	D-3
40.9	Effecting changes to drawings	D-4
40.10	Advertising	D-4
40.11	Qualification authority	D-4
40.12	Qualification and award of contracts	D-4
40.13	Advertising and notices	D-4
50.	Detailed requirements	D-5
50.1	Determinations to be made by the design or procuring activity	D-5
50.2	Publicity	D-5
50.2.1	Additional notice to industry	D-6
50.3	Application for qualification	D-6
50.3.1	Additional information	D-8
50.3.2	Additional or limited rights data	D-9
50.4	Authorization for qualification	D-9
50.5	Qualification data	D-9
50.5.1	Action on test data	D-9
50.5.2	Authorization for retest	D-9
50.5.3	Prior test data	D-9
50.6	Facilities survey	D-10
50.7	Retention of approved source of supply status	D-10
50.7.1	Drawing revision	D-10
50.7.2	Changes in product	D-10
50.8	Cost of testing	D-10
50.8.1	Changes in cost of testing	D-11
50.8.2	Changes for small business concerns	D-11
50.8.3	Charges for retesting	D-11
50.9	Availability of data	D-11
50.10	Data derived at industry expense	D-12
50.11	Deletion of a source of supply	D-12
50.11.1	Procedures for removal	D-13
50.11.2	Notification of removal	D-13
50.11.3	Publication of removal	D-13

<u>PARAGRAPH</u>		<u>PAGE</u>
50.12	Foreign manufacturers	D-14
50.12.1	Reciprocal qualification agreements	D-14

FIGURE		PAGE
200-1	Tabulation	200-12
200-2a	Drawing in book-form, (title sheet)	200-13
200-2b	Drawing in book-form, (continuation sheet)	200-14
200-3	Inseparable assembly drawing	200-15
200-4	Envelope drawing	200-16
200-5a	Standardized microcircuit drawing title sheet	200-17
200-5b	Standardized microcircuit drawing continuation sheet	200-18
200-6	Combination of adopted items drawing	200-19
200-7	Package content drawing	200-20
200-8	Software installation drawing	200-21
200-9	Camouflage pattern drawing	200-22
200-10	Transportability drawing	200-23
400-1	Example of CAGE Code, drawing no., design activity relationship as originally specified	400-4
400-2	Example of Drawing notation when design responsibility is transferred	400-6
500-1	Symbology	500-6
500-2	Duplicate original notation	500-7
500-3	Duplicate production master drawing notation	500-8
500-4	Location of CAD generated drawing note	500-9
600-1	Revision of a multi-sheet drawing	600-3
600-2	Superseded (old) drawing notations redrawn with same number	600-5
700-1	PL format generated from digital data	700-8
700-2	PL generated from digital data	700-9
700-3	Manually prepared PL	700-10
700-4	Manually prepared DL	700-11
700-5	DL generated from digital data	700-12
700-6	Manually prepared IL	700-13

FIGURE

		<u>PAGE</u>
A-1	Initial and signature block	A-1
A-2	Aperture card signature and revision history block	A-3
B-1	Sample security classification markings	B-2
B-2	Location of security markings on drawings	B-3
B-3	Location of security markings on roll size drawings	B-4
B-4	Location of security markings on associated lists	B-5
B-5	Location of security markings on digital data generated associated lists	B-6
B-6	Location of security markings and drawings in book-form	B-7
B-7	Regrading classification location	B-8
C-1	QAP symbol	C-3
C-2	Example of QAP notes on drawings	C-5

TABLE

		<u>PAGE</u>
I	Acronyms for special items and processes	500-5

1. SCOPE

1.1 Scope. This standard establishes the essential requirements and reference documents applicable to the preparation and revision of engineering drawings and associated lists for or by Departments and Agencies of the Department of Defense. See 6.1.1.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

L-F-340	Film, Diazotype, Sensitized, Moist and Dry Process, Roll and Sheet
L-P-519	Plastic Sheet, Tracing, Glazed Matte Finish
UU-P-221	Paper, Direct-positive Sensitized, (Diazotype)
UU-P-561	Paper, Tracing

DEPARTMENT OF DEFENSE

MIL-D-5480	Data, Engineering and Technical, Reproduction Requirements for
MIL-I-8500	Interchangeability and Replacement of Component Parts for Aircraft and Missiles
MIL-D-28000	Digital Representation for Communication of Product Data: IGES Application Subsets
MIL-M-28001	Markup Requirements and Generic Style Specification For Electronic Printed Output and Exchange of Text

MIL-T-31000

Technical Data Packages, General
Specification for

MIL-C-53072

Chemical Agent Resistant Coating
(CARC) System Application
Procedures and Quality Control
Inspection

FEDERAL INFORMATION PROCESSING STANDARDS

FIPS PUB 24

Flowchart Symbols and their Usage
in Information Processing

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-12

Abbreviations for Use on Drawings,
Specifications, Standards and in
Technical Documents

MIL-STD-25

Ship Structural Symbols for Use on
Ship Drawings

MIL-STD-129

Marking for Shipment and
Storage

MIL-STD-130

Identification Marking of U.S.
Military Property

MIL-STD-196

Joint Electronics Type Designation
System

MIL-STD-280

Definitions of Item Levels, Item
Exchangeability, Models, and
Related Terms

MIL-STD-498

Software Development and
Documentation

MIL-STD-882	System Safety Program Requirements
MIL-STD-883	Test Methods and Procedures for Microelectronics
MIL-STD-961	Defense Specification Practices
MIL-STD-962	Military Standards, Handbooks, and Bulletins, Preparation of
MIL-STD-973	Configuration Management
MIL-STD-1285	Marking of Electrical and Electronic Parts
MIL-STD-1306	Fluorics, Terminology and Symbols
MIL-STD-1388-1	Logistics Support Analysis
MIL-STD-1464	Army Nomenclature System
MIL-STD-1476	Metric System, Application in New Design
MIL-STD-1661	Mark and Mod Nomenclature System
MIL-STD-1686	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)
MIL-STD-1812	Type Designation, Assignment and Method for Obtaining
MIL-STD-1840	Automated Interchange of Technical Information
MIL-STD-2164	Environmental Stress Screening Process for Electronic Equipment

HANDBOOKS

MIL-HDBK-263

Electrostatic Discharge Control
Handbook for Protection
Electrical and Electronic Parts,
Assemblies and Equipment
(Excluding Electrically Initiated
Explosives Devices) Metric

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Copies of the Federal Information Processing Standards (FIPS) are available to Departments of Defense Activities from the DoDSSP, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19120-5099. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.)

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this standard to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DoD Cataloging Handbook
H4/H8

Commercial and Government Entity
(CAGE) Cataloging Handbook

DoD Cataloging Handbook
H6

Federal Item Name Directory for
Supply Cataloging

DoD Cataloging Handbook
H7

Manufacturers Part and Drawing
Numbering Systems for Use in the
Federal Cataloging System

DoDISS

Department of Defense Index of
Specifications and Standards

(Copies of Cataloging Handbooks H4/H8, H6 and H7 are available from the Commander, Defense Logistics Services Center, Battle Creek, MI 49017-3084. Copies of DoDISS are available on a yearly subscription basis either from the Government Printing Office for hard copy or 1/2 inch magnetic tape is available from the DoDSSP, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19120-5099).

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME B1.3M-1986	Screw Thread Gaging Systems for Dimensional Acceptability - Inch and Metric Threads (UN, UNR, UNJ, M, and MJ)
ANSI/ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)
ANSI B94.6	Knurling
ANSI/ASME Y10.3M-1984	Letter Symbols for Quantities Used in Mechanics and Time-Related Phenomena
ANSI Y10.20	Mathematical Signs and Symbols for Use in Physical Sciences and Technology (including ANSI Y10.20a)
ASME Y14.1	Decimal-Inch Drawing Sheet Size and Format
ASME Y14.1M	Metric Drawing Sheet Size and Format
ASME Y14.2M	Line Conventions and Lettering
ASME Y14.3M	Multiview and Sectional View Drawings
ASME Y14.4M	Pictorial Drawing
ASME Y14.5M	Dimensioning and Tolerancing
ANSI Y14.6	Screw Thread Representation and ANSI Y14.6AM (Metric Supplement)

ANSI Y14.7.1	Gear Drawing Standards, Part 1 for Spur, Helical, Double Helical and Rack
ANSI Y14.7.2	Gear and Spline Drawing Standards Part 2, Bevel and Hypoid Gears
ASME Y14.8M	Castings and Forgings
ANSI Y14.13M	Mechanical Spring Representation
ANSI Y14.15	Electrical and Electronic Diagrams
ANSI Y14.15a-1971	Interconnection Diagrams
ANSI Y14.15b-1973	Supplement to ANSI Y14.15-1966
ASME/ANSI Y14.18	Optical Parts
ASME Y14.24M	Types and Applications of Engineering Drawings
ASME Y14.34M	Parts Lists, Data Lists and Index Lists
ASME Y14.35M	Revision of Engineering Drawings and Associated Documents
ANSI Y14.36	Surface Texture Symbols
ANSI Y32.4	Graphic Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction
ANSI Y32.9	Graphic Symbols for Electric Wiring and Layout Diagrams Used in Architectural and Building Construction
ANSI Y32.10	Graphic Symbols for Fluid Power Diagrams

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E380

Standard for Metric Practice

AMERICAN WELDING SOCIETY (AWS)

ANSI/AWS A2.4

Symbols for Welding and
Nondestructive Testing

ANSI/AWS A3.0

Welding Terms and Definitions

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

ANSI/IEEE Std 91

Graphic Symbols for Logic Functions

IEEE Std 91a

Supplement to Graphic Symbols for
Logic Functions

ANSI/IEEE Std 200

Reference Designations for
Electrical and Electronic Parts and
Equipment

ANSI/IEEE Std 260

Letter Symbols for Units of
Measurement (SI Units, Customary
Inch-Pound Units and Certain Other
Units)

ANSI/IEEE Std 280

Letter Symbols for Quantities used
in Electrical Science and Electrical
Engineering (Same as ANSI Y10.5-
1985)

IEEE Std 315

Graphic Symbols for Electrical and
Electronic Diagrams

ANSI/IEEE Std 315a

Supplement to Graphic Symbols for
Electrical and Electronic Diagrams

ANSI/IEEE Std 991

Logic Circuit Diagrams

**INSTITUTE FOR INTERCONNECTING AND PACKAGING ELECTRONIC CIRCUITS
(IPC)**

ANSI/IPC-D-275 **Design Standards for Rigid Printed
Board Assemblies**

ANSI/IPC-D-350 **Printed Board Description in Digital
Form**

ANSI/IPC-T-50 **Terms and Definitions for
Interconnecting and Packaging
Electronic Circuits**

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AS1290 **Graphic Symbols for Aircraft
Hydraulic and Pneumatic Systems**

Copies of DoD adopted non-Government Standards are available to Military activities through the DoD Single Stock Point, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Military activities may obtain copies of non-DoD adopted documents from the sponsoring Industry Association. Non-military activities may obtain copies of non-Government standards and publications from the sponsoring Industry organization as follows:

(ANSI) American National Standards Institute
1430 Broadway
New York, NY 10018

(ASME) American Society of Mechanical Engineers
22 Law Drive
Fairfield, NJ 07007-2300

(ASTM) American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

(AWS) American Welding Society, Incorporated
550 Northwest Le Jeune Road
Miami, FL 33126

(IEEE) The Institute of Electrical and Electronics Engineers,
Incorporated
345 East 47th Street
New York, NY 10017

(IPC) Institute for Interconnecting and Packaging Electronic
Circuits
7380 North Lincoln Avenue
Lincolnwood, IL 60646

(SAE) Society of Automotive Engineers, Incorporated
400 Commonwealth Drive
Warrendale, PA 15096

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Acronyms and abbreviations used in this standard. The acronyms and abbreviations used in this standard are defined as follows:

a. ABCA	-	AMERICAN BRITISH CANADIAN AUSTRALIAN
b. AR-	-	AS REQUIRED
c. ASCC	-	AIR STANDARDIZATION COORDINATING COMMITTEE
d. CAD	-	COMPUTER AIDED DESIGN
e. CAD/CAM	-	COMPUTER AIDED DESIGN/COMPUTER AIDED MANUFACTURING
f. CAGE	-	COMMERCIAL AND GOVERNMENT ENTITY CODE
g. CAGEC	-	COMMERCIAL AND GOVERNMENT ENTITY CODE
h. CARC	-	CHEMICAL AGENT RESISTANT COATING
i. CDA	-	CURRENT DESIGN ACTIVITY
j. CSI	-	CRITICAL SAFETY ITEM
k. CSP	-	CRITICAL SAFETY PROCESS
l. DFARS	-	DEFENSE FEDERAL ACQUISITION REGULATION SUPPLEMENT
m. DL	-	DATA LIST
n. DLA	-	DEFENSE LOGISTICS AGENCY
o. DLSC	-	DEFENSE LOGISTICS SERVICES CENTER

p. DOD	DEPARTMENT OF DEFENSE
q. DoDISS	DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS
r. ECN	- ENGINEERING CHANGE NOTICE
s. ECP	- ENGINEERING CHANGE PROPOSAL
t. EGD	- ELECTRONIC GENERATED DATA
u. ERR	- ENGINEERING RELEASE RECORD
v. ESD	- ELECTROSTATIC DISCHARGE
w. FSCM	- FEDERAL SUPPLY CODE FOR MANUFACTURERS
x. GDA	- GOVERNMENT DESIGN ACTIVITY
y. HCI	- HARDNESS CRITICAL ITEM (NUCLEAR)
z. HCP	- HARDNESS CRITICAL PROCESS (NUCLEAR)
aa. IF	- INTERMEDIATE FREQUENCY
ab. IGES	- INITIAL GRAPHICS EXCHANGE SPECIFICATION
ac. IL	- INDEX LIST
ad. INT	- INTERFACE CONTROL
ae. MS	- MILITARY STANDARD (SHEET FORM)
af. NOR	- NOTICE OF REVISION
ag. NSN	- NATIONAL STOCK NUMBER
ah. ODA	- ORIGINAL DESIGN ACTIVITY

ai. ODC	-	OZONE DEPLETING CHEMICAL
aj. ODS	-	OZONE DEPLETING SUBSTANCE
ak. OCI	-	OBSERVABLE CRITICAL ITEM
al. OCP	-	OBSERVABLE CRITICAL PROCESS
am. PIN	-	PART OR IDENTIFYING NUMBER
an. PL	-	PARTS LIST
ao. QAP	-	QUALITY ASSURANCE PROVISION
ap. QSTAG	-	QUADRIPARTITE STANDARDIZATION AGREEMENT (AMERICAN-BRITISH- CANADIAN-AUSTRALIAN ARMY STANDARDIZATION PROGRAM)
aq. SGML	-	STANDARDIZED GENERAL MARKUP LANGUAGE
ar. SMD	-	STANDARDIZED MILITARY DRAWING
as. STEP	-	STANDARD FOR THE EXCHANGE OF PRODUCT DATA

3.2 Acceptance. The act of an authorized representative of the Government by which the Government assumes for itself, or as an agent of another, ownership of existing and identified supplies tendered, or approves specific services rendered, as partial or complete performance of the contract on the part of the contractor.

3.3 Adopted items. Items approved for inclusion in the DoD logistics system through assignment of National Stock Number (NSN) by the Defense Logistics Agency (DLA), or recognition by DLA of item Reference Numbers as established by manufacturer's part number, specification or drawing, or trade name (when items are identifiable by trade name only).

3.4 Altered item. An altered item is an existing item, under the control of another design activity or defined by a nationally recognized standardization document, that is subjected to physical alteration to meet the design requirements.

3.5 Approved Item name. An approved item name is a name approved by the Directorate of Cataloging, Defense Logistics Services Center and published in the Cataloging Handbook H6, Federal Item Name Directory for Supply Cataloging.

3.6 Artwork Master. An accurately-scaled configuration which is used to produce the Production Master. (ANSI/IPC-T-50)

3.7 Assembly. A number of parts or subassemblies or any combination thereof joined together to perform a specific function, and subject to disassembly without degradation of any of the parts. (Examples: power shovel-front, fan assembly, audio-frequency amplifier).

NOTE: The distinction between an assembly and a subassembly is determined by individual application. An assembly in one instance may be a subassembly in another where it forms a portion of a higher assembly.

3.7.1 Inseparable assembly. See 3.57.

3.8 Associated list. A tabulation of pertinent engineering information pertaining to an item depicted on an engineering drawing or on a set of engineering drawings.

3.9 Bulk items. Bulk items are those constituents of an assembly or part, such as oil, wax, solder, cement, ink, damping fluid, grease, flux, welding rod, twine or chain, that satisfies one or more of the following criteria:

- a. the quantity required cannot readily be predetermined

- b. the physical nature of the material is such that it is not adaptable to pictorial representation
- c. the finished size is obtainable through use of such tools as shears, pliers or knives, without further machining operation, and the final configuration is such that it can be described in writing without the necessity of pictorial representation.

3.10 Chemical Agent Resistant Coating (CARC). A CARC (MIL-C-53072) enhances the decontamination process for combat and support equipment that is subjected to surface contamination by chemical attack on the battlefield. Chemical agents deposited on the surface of CARC paints remain on the surface, and can be removed with decontaminant procedures without destroying the coating.

3.11 Code Identification. See Commercial And Government Entity (CAGE) Code.

3.12 Combination of Items. A combination of items, such as a cartridge, links and container, in a single composite unit consisting of one or more items with the related equipment, tools and spare parts which make the unit complete for issue. A combination may also consist of two or more items without equipment, tools or spare parts.

3.13 Commercial and Government Entity (CAGE) Code. A five character code listed in Cataloging Handbook H4/H8, Commercial and Government Entity (CAGE) Code, which is assigned to commercial and Government activities that manufacture or develop items, or provide services or supplies for the Government. When used with a drawing number or part number, the CAGE Code designates the design activity from whose series the drawing or PIN is assigned. The CAGE Code was previously called manufacturer's

3.14 Commercial Item. A product, material, code, code identification number or Federal Supply Code for Manufacturers (FSCM), component, sub-system, or system sold or traded to the general public in the course of normal business operations at prices based on established catalog or market prices. (MIL-T-31000)

3.15 Contract. A mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. It includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing. In addition to bilateral instruments, contracts include, but are not limited to, awards and notices of

awards; job orders or task letter issued under basic ordering agreements; letter contracts; orders, such as purchase orders, under which the contract becomes effective by written acceptance or performance; and bilateral contract modifications.

3.16 Contracting activity. That Government activity having a legal agreement or order with an individual, partnership, company, corporation, association or other entity for the design, development, manufacture, maintenance, modification, or supply of items or services.

3.17 Contractor. An individual, partnership, company, corporation, association or other service having a contract with the Government for the design, development, manufacture, maintenance, modification or supply of items under the terms of a contract. A Government activity performing any or all of the above functions is considered to be a contractor for configuration management purposes. (MIL-STD-973)

3.18 Copy. Any reproduction or duplication, in any media, of an original.

3.19 Critical safety characteristic. Any feature, such as tolerance, finish, material composition, manufacturing, assembly or inspection process or product, which if nonconforming or missing, could cause the failure or malfunction of the critical safety item.

3.20 Critical safety item (CSI). A part, assembly, installation or production system with one or more critical characteristics that, if not conforming to the design data or quality requirements would result in an unsafe condition. Unsafe conditions relate to hazard severity categories I and II of MIL-STD-882, System Safety Program Requirements, and include conditions which could cause loss or serious damage to the end item or major components, loss of control or serious injury to personnel.

3.21 Current design activity (CDA). An activity (Government or contractor) currently having responsibility for the design of an item, and the preparation or maintenance of drawings and associated documents. Current design activity could be the original activity or new activity when that responsibility is transferred from another Government or contractor design activity.

3.22 Department Of Defense Index of Specification and Standards (DoDISS). The DoD publication that lists unclassified Federal and military specifications and standards, related standardization documents, and voluntary standards approved for use by DoD.

3.23 Design activity. A design activity is an activity that has, or has had, responsibility for the design of an item. The activity may be Government, commercial, or nonprofit organization. (ASME Y14.24M). See also "current design activity" and "original design activity".

3.24 Digital data. Data stored on a computer system which employs a display on which the user and the computer interact to create entities for the production of layouts, drawings, numerical control tapes, or other engineering data.

3.25 Distribution statement. A statement used in marking a technical document to denote the extent of its availability for distribution, release, and disclosure without need for additional approvals and authorizations from the controlling DoD office.

3.26 Document. Document applies to the specifications, drawings, lists, standards, pamphlets, reports and printed, typewritten or other information, relating to the design, procurement, manufacture, test or acceptance inspection of items or services.

3.27 Drawing (engineering). An engineering document or digital data file(s) that discloses (directly or by reference), by means of graphic or textual presentations, or combinations of both, the physical and functional requirements of an item.

3.28 Drawing format. The arrangement and organization of information within a drawing. This includes such features as the size and arrangement of blocks, notes, lists, revision information, and use of optional or supplemental blocks.

3.29 Duplicate original. A replica of an engineering drawing or digital data file(s) created to serve as the official record of the item when the original has been lost.

3.30 End-product (end-item). An end-product is an item, such as an individual part or assembly, in its final or completed state. (ASME Y14.24M)

3.31 Engineering data. Engineering documents such as drawings, associated lists, accompanying documents, manufacturer specifications and standards, or other information prepared by a design activity and relating to the design, manufacture, procurement, test or inspection of items.

3.32 Federal Supply Code for Manufacturers (FSCM). See Commercial and Government Entity (CAGE) Code.

3.33 Find number or item number. A reference number assigned to an item in lieu of the item's identifying number on the field of the drawing and entered as a cross reference to the item number of the parts lists where the item name and identification number are given. Reference designations in accordance with ANSI/IEEE Std 200 may be used as find numbers or item numbers. (ASME Y14.34M).

3.34 Firmware. The combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device. The software cannot be readily modified under program control. (MIL-STD-498).

3.35 Government design activity (GDA). The Government agency responsible, or scheduled to become responsible, for configuration management and design requirements of a configuration item.

3.36 Group. A collection of units, assemblies or subassemblies which is a sub-division of a set or system, but which is not capable of performing a complete operational function. (Examples: antenna group, indicator group.)

3.37 Initial Graphics Exchange Specification (IGES). A neutral file format for the representation and transfer of product definition data among CAD/CAM systems and application programs. (MIL-STD-1840).

3.38 Interchangeable item. One which possesses such functional and physical characteristics as to be equivalent in performance to another item of similar or identical purposes; and is capable of being exchanged for the other item without selection for fit or performance, and without alteration of the items themselves or of adjoining items, except for adjustment. (ASME Y14.24M)

3.39 Interface characteristic. Those characteristics which affect the physical or functional characteristics of co-functioning items. The characteristics are established to allow equipment or systems to be compatible with equipment or systems under the control of different customers, contractors, or design activities. Changes to interface characteristics shall be coordinated with all affected activities.

3.40 Item. A non-specific term used to denote any unit or product including materials, parts, assemblies, equipment, accessories and computer software.

3.41 Item identification. The combination of the part or identifying number and the original design activity CAGE Code. (NOTE: Not applicable to vendor item control drawings.)

3.42 Manufacturer. An individual, company, corporation, firm or Government activity who:

- a. controls the production of an item, or
- b. produces an item from crude or fabricated materials, or
- c. assembles materials or components, with or without modification, into more complex items.

3.43 Master drawing. A document that shows the dimensional limits or grid locations applicable to any or all parts of a printed board (rigid or flexible), including the

arrangement of conductive and nonconductive patterns or elements, size, type, and location of holes; and any other information necessary to describe the product to be fabricated. (ANSI/IPC-T-50)

3.44 Matched parts. Matched parts are those parts, such as special application parts, which are machine or electrically matched, or otherwise mated, and for which replacement as a matched set or pair is essential.

3.45 Nationally recognized standard. A specification or standard issued with the intent to establish common technical requirements. Such standards are developed by or for a Government activity or by a non-Government organization (private sector association, organization, or technical society) which conducts professional standardization activities (plans, develops, establishes, or publicly coordinates standards, specifications, handbooks, or related documents) and is not organized for profit. (ASME Y14.24M)

3.46 National Stock Number (NSN). A number assigned to each item of supply, that is purchased, stocked or distributed within the Federal Government.

3.47 Non-Government standard (or document). A standardization document developed by a private sector association, organization or technical society which plans, develops, establishes or coordinates standards, specifications, handbooks or related documents. Non-Government standards adopted by the DoD are listed in the DoDISS. (MIL-STD-962)

3.48 Non-part drawing. An engineering drawing that provides requirements, such as procedures or instructions, applicable to an item, when it is not convenient to include this information on the applicable part drawing. Examples include test requirements drawing and logic diagram.

3.49 Nuclear effects. In this context, nuclear effects include the effects on assemblies, subassemblies or parts due to nuclear-power sources, space radiation or nuclear-weapon-produced environments.

3.50 Nuclear Hardness Critical Item (HCI). A Nuclear HCI is an item of hardware or software that satisfies one or more of the following conditions:

- a. Functionally required hardware (meaning hardware included in system design to satisfy any requirement other than nuclear hardening) whose response to the specified nuclear environments could cause degradation in system survivability unless additional provisions for hardness are included in the item specification, design, manufacture, item selection process, provisioning, configuration control, etc.

- b. Functionality required hardware or software that inherently provides protection** for the system or any of its elements against the specified nuclear environments, and which if modified, removed or replaced by an alternate design could cause a degradation in system survivability.
- c. Hardness dedicated hardware or software included in the system solely to achieve system nuclear survivability requirements.
- d. Hardware items (at the level of application) to which a Hardness Critical Process (HCP) is applied.
- e. A subassembly or higher level of assembly which contains one or more HCIs.

** (for example, the item was not designed for its nuclear weapon response but has the intrinsic capability to perform adequately in the specified nuclear environments. This definition includes items whose design is modified to provide for nuclear survivability of other items, but not to provide for their own survivability.)

3.51 Nuclear Hardness Critical Process (HCP). A Nuclear HCP is any fabrication, manufacturing, assembly, installation, maintenance and repair, or other process or procedure which implements a hardness design feature and satisfies system hardness requirements.

3.52 Observable Critical Item (OCI). An OCI is any part or material specifically designed, selected or qualified to meet specified observable requirements.

3.53 Observable Critical Process (OCP). An OCP is any fabrication, manufacturing, assembly, installation, maintenance and repair, or other process or procedure which implements an observable design and satisfies observable system requirements.

3.54 Original. The current design activity's full size reproducible drawing or digital data file(s) on which is kept the revision record recognized as official.

3.55 Original date. A date that establishes the origination of the drawing and is retained throughout the life of the drawing for historical record purposes.

3.56 Original design activity (ODA). An activity (Government or contractor) having had responsibility originally for the design of an item and whose drawing number and CAGE Code is shown in the title block of drawings and associated documents.

3.57 Part. One piece, or two or more pieces joined together, which are not normally

subject to disassembly without destruction or impairment of designed use. (Examples: transistor, composition resistor, screw, gear, transformer, milling cutter) See 3.7.1.

3.58 Part or Identifying Number (PIN). The identifier assigned by the responsible design activity or by the controlling nationally recognized standard which uniquely identifies (relative to that design activity) a specific item. The PIN generally includes the controlling drawing or document number and optional suffix. The PIN does not include the drawing revision identifier, drawing size, or CAGE Code. The term "part or identifying number" replaces the terms "part number" and "bulk material identification number". (ASME Y14.24M and MIL-STD-961)

3.59 Procuring activity. A component of a Government agency having a significant acquisition function and designated as such by the head of the agency. Unless agency regulations specify otherwise, the term "procuring activity" shall be synonymous with "contracting activity."

3.60 Product. Includes materials, parts, components, subassemblies, assemblies, and equipments. The term product wherever used in this document shall also encompass a family of products. A family of products is defined as all products of the same classification, design, construction, material, type, etc., produced with the same production facilities, processes, and quality of material, under the same management and quality controls, but having the acceptable variety of physical and functional characteristics defined and specified in the applicable engineering documentation.

3.61 Product definition data. Denotes the totality of data elements required to completely define a product. Product definition data includes geometry, topology, relationships, tolerances, attributes and features necessary to completely define a component part or an assembly of parts for the purpose of design, analysis, manufacture, test and inspection. (MIL-D-28000).

3.62 Production master. A 1 to 1 scale pattern which is used to produce one or more printed boards (rigid or flexible) within the accuracy specified on the Master Drawing. (ANSI/IPC-T-50).

3.63 Qualification. The formal process by which a manufacturer's product is examined for compliance with the requirements of a source control drawing for the purpose of approving the manufacturer as a source of supply. (ASME Y14.24M).

3.64 Quality assurance. A planned and systematic pattern of all actions necessary to provide adequate confidence that management and technical planning and controls are adequate to:

- a. Establish correct technical requirements for design and manufacturing.

- b. Create products and services that conform to the established technical requirements.

3.65 Quality assurance provisions (QAP). QAP's are the documented requirements, procedures and criteria necessary for demonstrating that designs conform to user requirements and that materiel and associated services conform to approved designs. In the context of this standard, "QAP" is used to convey a document prepared separate from, but in direct support of, the stated drawing requirements.

3.66 Referenced documents. Design activity standards, drawings, specifications, or other documents referenced on drawings or lists.

3.67 Repair parts. Those support items that are an integral part of the end item or system which are coded as non-repairable. (MIL-STD-1388-1)

3.68 Repairable. Having the capability of being repaired.

3.69 Replacement drawing. A replacement drawing is a new original drawing substituted for the previous original drawing of the same drawing number.

3.70 Revision. Any change to an original drawing which requires the revision level to be advanced.

3.71 Revision authorization. A revision authorization is a document such as a Notice of Revision (NOR), Engineering Change Notice (ECN) or Revision Directive (RD) which describes the changes to be made to the drawing in detail and is issued by the activity having the authority to revise the drawing.

3.72 Selected item. A selected item is an existing item, under the control of another design activity or defined by a nationally recognized standardization document, that is subjected to refined acceptance criteria (such as fit, tolerance, performance, or reliability) to meet design requirements.

3.73 Set. A unit or units and necessary assemblies, subassemblies and parts connected or associated together to perform an operational function. (Examples: radio receiving set; sound measuring set, which includes parts assemblies and units such as cable, microphone and measuring instruments; radar homing set) Set is also used to denote a collection of like parts such as a tool-set or a set of tires.

3.74 Specialized segment of industry. A business entity having recognized expertise in developing, manufacturing, or both, specific products or product lines to meet customer requirements.

3.76 Specification. A document prepared specifically to support acquisition which clearly and accurately describes essential technical requirements for purchasing materiel. Procedures necessary to determine that the requirements for the materiel covered by the specification have been met are also included. (MIL-STD-961).

3.76 Standard. A document that establishes engineering and technical requirements for items, equipments, processes, procedures, practices and methods that have been adopted as standard. Standards may also establish requirements for selection, application and design criteria for materiel. (MIL-STD-962).

3.77 Standardization document. A document developed by the Government or private sector association, organization, or technical society which plans, develops, establishes or coordinates standards, specifications, handbooks, or similar documents for the purpose of standardizing items, materials, processes, or procedures.

3.78 Standard, company. A company document which establishes engineering and technical limitations and applications for items, materials, processes, methods, designs and engineering practices unique to that company. (MIL-T-31000).

3.79 Standard, military. Military standards are documents issued within the Department of Defense in accordance with the basic policy of the Defense Standardization and Specification Program. Military standards are used for the comprehensive presentation of engineering practices (including test methods), procedures, processes, codes, safety requirements, symbols, abbreviations, nomenclatures, type designations and characteristics for standard equipments or items, either singly or in families. Military standards are also used to cover overall characteristics of families of end items or major components. These characteristics include, as applicable, envelope dimensions, performance ratings, primary structural features, and data required for the interchangeability of components. Limited coordination standards follow the same procedures and processes for format as specified for coordinated standards. (MIL-STD-962)

3.80 Subassembly. Two or more parts which form a portion of an assembly or a unit replaceable as a whole, but having a part or parts which are individually replaceable. (Examples: gun mount stand, window sash, recoil mechanism, floating piston, telephone dial, Intermediate Frequency (IF) strip, terminal board with mounted parts.) (MIL-STD-280)

3.81 Supplier. See Vendor.

3.82 Symmetrically opposite parts. Symmetrically opposite parts are those parts which are mirror images of each other.

3.83 System (general). A composite of equipment, skills and techniques capable of performing or supporting an operational role or both. A complete system includes all equipment, related facilities, material, software, services and personnel required for its operation and support to the degree that it can be considered a self-sufficient unit in its intended operational environment. (MIL-STD-280)

3.84 Unit. An assembly or any combination of parts, subassemblies and assemblies mounted together normally capable of independent operation in a variety of situations. (Examples: Hydraulic jack, electric motor, electronic power supply, internal combustion engine, electric generator, radio receiver.)

NOTE: The size of an item is a consideration in some cases. An electric motor for a clock may be considered as a part because it is not normally subject to disassembly.

3.85 Vendor. A source from whom a purchased item is obtained; used synonymously in this standard with the term supplier.

4. GENERAL REQUIREMENTS

4.1 Coverage. The general requirements for the preparation of engineering drawings and associated lists shall be in accordance with Chapter 100 as contained herein.

4.1.1 Reference to this standard. Unless otherwise specified, where drawings are based on this Standard, this fact shall be noted on the drawings. References to this Standard may include the applicable Revision level (letter) and Notice number(s). See 6.2.2.

5. DETAILED REQUIREMENTS

5.1 Applicability. Detailed requirements for the preparation of engineering drawings and associated lists shall be in accordance with Chapters 200 through 700 as contained herein.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The requirements contained herein apply to hardcopy drawings, digital data file(s), associated lists and textual data resulting from the contractual application of DOD-D-1000, MIL-T-31000 or MIL-T-47500.

6.1.1 Applicability The current document specifying engineering drawings as a technical data package element is MIL-T-31000. DOD-D-1000 and MIL-T-47500 are inactive for new design.

6.2 Acquisition requirements.

6.2.1 Issue of DODISS. When this standard is used in acquisition, the applicable issue of the DODISS must be cited in the solicitation (see 2.1.1, and 2.2).

6.2.2 Tailoring guidance. To ensure proper application of this standard, invitations for bids, requests for proposals, statements of work, and Contract Data Requirements Lists (CDRLs) must tailor the requirements in Chapters 100 through 700 to exclude unnecessary requirements. It is essential that the contractual applicability of the numerous referenced documents, as contained herein, especially Chapter 100, be as definitive as practicable. Any tailoring of MIL-STD-100 must also be consistent with MIL-T-31000, TDP Option Selection Worksheets. Although the manner and extent of such tailoring will vary in accordance with program or end-item requirements, the following is provided as a minimum for consideration in acquisition documents:

TAILORING

A. Drawing Media (101.14) (Choose all that apply)

- (1) Non-digital (Specify _____)
- (2) Digital Data (Specify _____)
- (3) Other (Specify _____)

B. Drawing Format (Choose One)

- (1) Contractor
- (2) Government (forms supplied by the Government)
- (3) Government (forms supplied by the Contractor)

C. Drawing Sheet Size (and Format) (101.1) (Choose One)

- (1) ASME Y14.1
- (2) ASME Y14.1M

D. Drawing Reference to MIL-STD-100 (4.1.1) (Choose all that apply)

- (1) Reference to MIL-STD-100 will not appear on drawing
- (2) Reference to MIL-STD-100 will be made on drawing
 - (a) Reference to MIL-STD-100 to include applicable revision level
 - (b) Reference to MIL-STD-100 to include applicable revision level and notices

E. Application Data (101.1.3) (Choose all that apply)

- (1) Contractor option
- (2) Required
 - (a) On drawing

(b) By reference. (Specify _____)

(c) Contractor option

(3) General use or multi-use notations

(a) allowed

(b) not allowed

F. Drawing Detail (ASME Y14.24M) (Choose all that apply)

(1) Monodetail

(2) Multidetail

(3) Tabulated

G. Dimensioning and Tolerancing (101.5, 101.18.6e, 602) (Choose all that apply)

(1) Metric

(2) Decimal-inch

(3) Application of ANSI Y14.5M

(a) Specific issue (revision) required (Specify issue _____)

(b) Issue in effect (Specify issue _____)

H. Drawing Notes (101.18.5, 101.18.6) (Choose One)

(1) On drawing

(2) By reference. (Specify _____)

(3) Contractors option

I. Quality Assurance Provisions (QAP) (101.18.6h and Appendix C) (Choose all that apply)

(1) Not required

(2) Integral to drawing

(3) Separate document

(a) Included in supporting military or program
unique specification

(b) Detailed in a distinct, contractually deliverable QAP data element

(c) Contractor option

J. Types of Drawings (ASME Y14.24M and Chapter 200) (Choose one)

(1) Contractor selects

(2) Government selects

**K. Maintenance of Multi-Sheet Drawings (ASME Y14.35M and Chapter 600)
(Choose all that apply)**

(1) Drawing revision level (DOD preferred)

(2) All sheets same revision level

(3) Sheet revision level

**L. Redrawn Drawings (redrawing without change) (ASME Y14.35M and
Chapter 600) (Choose one)**

(1) Advance revision level

(2) Revision level is not advanced

M. Maintenance of Revision History (605.4) (Choose all that apply)

(1) Contractor option

(2) Optional methods

(a) Remove one or more revision record as required

(b) Remove all previous revision history

- (c) Remove all revision history but retain line entry for revision authorization and date of revision
- (d) Remove all except revision preceding current
- (e) Maintain revision history in its entirety

N. Adding Sheets (ASME Y14.35M) (Choose all that apply)

- (1) Contractor option
- (2) Optional methods
 - (a) Renumber sheet using consecutive whole numbers
 - (b) Number added sheets in decimal-number sequence
 - (c) Number added sheets in alpha-numeric sequence

O. Deleting Sheets (ASME Y14.35M) (Choose all that apply)

- (1) Contractor option
- (2) Optional methods
 - (a) Renumber all affected remaining sheets
 - (b) Affected remaining sheets not renumbered (revision status of sheets block is updated with notations such as CANC or DEL)

P. Markings on Engineering Drawings (Chapter 500) (Choose one)

- (1) Special items and processes apply
 - (a) Applicable symbols (Specify _____)
 - (b) Applicable special notes (Specify _____)
- (2) Special items and processes do not apply

Q. Associated Lists (ASME Y14.34M and Chapter 700) (Choose all that apply)

- (1) Non-digital (Specify _____)

(2) Digital Data (Specify _____)

(3) Other (Specify _____)

R. Type of Associated Lists (ASME Y14.34M and Chapter 700) (Choose all that apply)

(1) Parts Lists

(a) Integral

(b) Separate

(c) Contractors option

(2) Data Lists

(3) Index Lists

(4) Other (Specify _____)

S. Angle of Projection (ASME Y14.3M) (Choose one)

(1) 3rd Angle

(2) 1st Angle

T. Language (Choose one)

(1) English required

(2) Other (as specified)

6.3 International agreements. Certain provisions of this Military Standard are the subject of International Standardization Agreements (see following listing). When revision or cancellation of this standard is proposed which will affect or violate the International Agreement concerned, the Preparing Activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

6.3.1 Air Standardization Coordinating Committee (ASCC), Air Standards (AIR STDs):

- ASCC AIR STD 104/2, Graphical Symbology for use on Engineering Drawings and Associated Data.
- ASCC AIR STD 104/5, Definitions for use on Engineering Drawings and Associated Data.
- ASCC AIR STD 104/6, Engineering Drawing Formats.
- ASCC AIR STD 104/9, Abbreviations for use on Engineering Drawings and Associated Data.
- ASCC AIR STD 104/10, Engineering Drawing Titles.
- ASCC AIR STD 104/11, Types of Engineering Drawings.
- ASCC AIR STD 104/12, Numbering, Coding and Identification of Engineering Drawings.
- ASCC AIR STD 104/13, Revision of Engineering Drawings.
- ASCC AIR STD 104/20, Electrical and Electronic Diagrams
- ASCC AIR STD 104/24, Engineering and Associated Data Lists
- ASCC AIR STD 104/26, Engineering Drawing Practices

6.3.2 American, British, Canadian, Australian (ABCA) Army Standardization Program, Quadripartite Standardization Agreements (QSTAGs):

- QSTAG 229, Abbreviations For Use On Drawings.
- QSTAG 275, Graphical Symbols For Electrical and Electronic Diagrams.
- QSTAG 323, Welding Symbols.

- QSTAG 324, Welding Terms and Definitions.

- QSTAG 326, Graphical Symbols For Use In Diagrams For Fluid Systems In Army
Vehicles (Excluding Aeronautic or Guided Weapon (Missile) Systems

6.4 Drawing ownership and drawing identification

6.4.1 Drawing identification. Drawing identification is provided by the combination of the original design activity CAGE Code and the drawing number. Drawing identification would therefore be established by the combination of a Government original design activity CAGE Code and a Government supplied drawing number, or a contractor original design activity CAGE Code and a contractor furnished drawing number. Accordingly, it is a violation of the intent of drawing identification to attempt to establish drawing identification by either a combination of Government CAGE Code and contractor furnished drawing number or contractor CAGE Code and Government furnished drawing number.

6.4.2 Design activity, current or original. Correct application of this standard necessitates that drawing ownership, change control authority, and design responsibility be identified with the current or original design activity CAGE Code appearing on the drawing. The design activity CAGE Code and address appearing in the title block is intended to identify that activity that had initial or original design activity (ownership, change control or design authority) responsibility. Since drawing identification can never be changed, a transfer of design activity responsibility requires the addition of the gaining activity CAGE Code and address to the drawing, as detailed in Chapter 400.

6.4.3 Drawing ownership. If for contractual or drawing maintenance purposes, the indication of current or original design activity does not reflect the actual status of drawing ownership or change control authority, that activity having final change control authority must add their CAGE Code and address to the drawing as current design activity. In this way, for example, if a CAGE Code and address in the title block reflects drawing origin, contractual preparation, or maintenance responsibility, but the drawing is the legal property of another activity, it is essential that the activity claiming the drawing as legal property add their CAGE Code and address as current design activity.

6.5 Ozone depleting chemicals. The identification of ozone depleting chemicals must be in conformance to Section 602(a) of the Clean Air Act Amendments of 1990 (42 USC 7671a) as identified in Section 326 of PL 102-484.

6.6 Subject term (key word) listing.

Acronym
Altered item
Assembly
Associated list
Bulk item
CAGE Code
Contract number
Critical safety
Design activity
Diagram
Digital data
Dimensioning
Distribution Statement
Drawing number
Electrostatic Discharge Sensitive
Item identification
Notes
Nuclear hardness
Part or identifying number
Parts list
Product definition data
Qualification
Selected item
Source control
Vendor item control

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CHAPTER 100

PREPARATION OF ENGINEERING DRAWINGS

100. General. This chapter establishes the essential general requirements and reference standards acceptable for the preparation of engineering drawings and associated lists.

101. Basic practices.

101.1 Size and format of engineering drawings.

101.1.1 Metric. Metric drawing sheet sizes and format shall be in accordance with ASME Y14.1M.

101.1.2 Decimal-inch. Decimal-inch drawing sheet sizes and format shall be in accordance with ASME Y14.1.

101.1.3 Application data. When used, Application Data with "Next Assembly" and "Used On" columns are required for drawings whose detail part or assembly depicted thereon is for an element of a larger item. The Next Assembly ("NEXT ASSY") column shall show the drawing number(s) of the next larger assembly(ies) to which the drawing applies. The Used On ("USED ON") column shall show the model number or equivalent designator of the assembled unit(s) of which the part is an element. The Application Data shall be located near the Title Block on sheet 1, or placed on a separate referenced document, or provided on a separate parts list. When the application data appears on a separate referenced document, a cross reference note shall be included on each parent drawing to indicate that a separate referenced document is available. When application data is included on a separate Parts List, the note required by 705.3.1 shall be expanded to read "SEE SEPARATE PARTS LIST FOR PARTS AND APPLICATION DATA".

101.2 Line conventions and lettering. Lines and lettering shall meet the legibility and reproducibility requirements of MIL-D-5480 and shall be in accordance with ASME Y14.2M.

101.3 Single, multiple and sectional view drawings. Single, multiple and sectional views shown on engineering drawings shall be in accordance with ASME Y14.3M.

101.3.1 Isometric and pictorial views. Isometric or pictorial views may be shown on engineering drawings providing clarity is not degraded. See 203.

101.3.2 Projection systems. Projection systems and associated symbols shall be in accordance with ASME Y14.3M.

101.4 Metric values. Metric values, when used on engineering drawings, shall be in accordance with ASTM E380.

101.4.1 Metric designs. When use of MIL-STD-1476 is a design requirement, drawings shall be identified as metric and the metric system shall be applied in accordance with MIL-STD-1476.

101.5 Dimensioning and tolerancing. Dimensioning and tolerancing shall be in accordance with ASME Y14.5M and the following:

101.5.1 Application. Reference to ASME Y14.5M shall always include the year of issue applicable to the drawing in question, for example "ASME Y14.5M-1994". See also 101.18.6e.

101.5.2 Knurling dimensioning. Knurling dimensioning shall be in accordance with ANSI B94.6.

101.6 Surface texture. Surface texture, waviness and lay shall be indicated in accordance with ANSI/ASME B46.1.

101.6.1 Surface texture symbols. Surface texture symbols shall be in accordance with ANSI Y14.36.

101.7 Screw thread representation. Screw threads shall be represented in accordance with ANSI Y14.6 and Y14.6AM. References to screw thread acceptability gaging systems shall be in accordance with ANSI/ASME B1.3M.

101.8 Gears. Gears shall be delineated in accordance with ANSI Y14.7.1 and Y14.7.2.

101.9 Mechanical springs. Mechanical springs shall be delineated in accordance with ANSI Y14.13M.

101.10 Optical elements and optical systems. Optical elements and optical systems shall be delineated in accordance with ASME/ANSI Y14.18.

101.11 Castings and forgings. Castings and forgings shall be delineated in accordance with ASME Y14.8M.

101.12 Graphic symbols, designations, letter symbols and abbreviations. Graphic symbols, designations, letter symbols and abbreviations used on engineering drawings and associated lists shall be in accordance with this standard and the standards

indicated below. Where graphic symbols, designations, letter symbols and abbreviations are not covered by the listed standard; they may be used provided they are explained on each drawing or referenced to an explanatory document. The referenced explanatory documents for non-standard symbols shall be furnished with the engineering drawings. When non-standard graphic symbols, designations, letter symbols and abbreviations are used repeatedly, they should be forwarded to the custodian of this standard for possible inclusion in the respective standard.

101.12.1 Graphic symbols.

101.12.2 Graphic symbols for electrical and electronics diagrams. Graphic symbols for electrical and electronics diagrams shall be in accordance with IEEE Std 315 and Supplement ANSI/IEEE STD 315a.

101.12.3 Graphic symbols for logic functions. Graphic symbols for logic functions shall be in accordance with ANSI/IEEE Std 91 and Supplement IEEE Std 91a.

101.12.4 Graphic symbols for flowchart diagrams. Flowchart symbols for use in information processing shall be in accordance with FIPS PUB 24.

101.12.5 Graphic symbols for fluoric power diagrams. Graphic symbols for fluoric power diagrams shall be in accordance with MIL-STD-1308.

101.12.6 Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction. Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction shall be in accordance with ANSI Y32.9.

101.12.7 Graphic symbols for plumbing fixtures. Graphic symbols for plumbing fixtures for diagrams used in architecture and building construction shall be in accordance with ANSI Y32.4.

101.12.8 Graphic symbols for aircraft hydraulic and pneumatic systems. Graphic symbols for aircraft hydraulic and pneumatic systems diagrams shall be in accordance with SAE AS1290.

101.12.9 Ship structural symbols. Ship structural symbols shall be in accordance with MIL-STD-25.

101.12.10 Welding symbols. Welding symbols shall be in accordance with ANSI/AWS A2.4 together with terms and definitions in accordance with ANSI/AWS A3.0.

101.12.11 Nondestructive testing symbols. Nondestructive testing symbols shall be indicated in accordance with ANSI/AWS A2.4.

101.12.12 Graphic symbols for fluid power diagrams. Graphic symbols for fluid diagrams shall be in accordance with ANSI Y32.10.

101.12.13 Reference designations for electrical and electronics parts and equipment. Reference designations for electrical and electronics parts and equipment shall be assigned in accordance with ANSI/IEEE Std 200, IEEE Std 315, and Supplement ANSI/IEEE Std 315a.

101.12.14 Letter symbols. Letter symbols, when used on engineering drawings, shall be in accordance with ANSI/ASME Y10.3M and ANSI/IEEE Stds 260 and 280.

101.12.15 Mathematical signs and symbols. Mathematical signs and symbols shall be in accordance with ANSI Y10.20 and Y10.20a.

101.12.16 Abbreviations. Abbreviations shall be in accordance with ASME Y1.1.

101.13 Diagrams.

101.13.1 Electrical and electronics diagrams. Electrical and electronics diagrams and interconnection diagrams shall be in accordance with ANSI Y14.15, Y14.15a and Y14.15b.

101.13.1.1 Logic circuit diagrams. Logic circuit diagrams shall be in accordance with ANSI/IEEE Std 991.

101.13.2 Printed board drawings. Printed board drawings shall be in accordance with the requirements of MIL-STD-2118, ANSI/IPC-FC-250, and ANSI/IPC-D-275, as applicable.

101.13.3 Printed board description in digital form. When printed board descriptions are in digital form (defined either by metric or decimal-inch units) the description and form shall be in accordance with ANSI/IPC-D-350.

101.14 Data preparation, maintenance, delivery, or access.

101.14.1 Materials.

101.14.1.1 Plastic sheet or roll. Originals on plastic sheet shall be in accordance with L-P-519, type I or II, class 2. Undimensioned drawings, printed wiring artwork masters,

production masters, and master pattern drawings shall be in accordance with MIL-D-5480, Class 2, Type A or B or L-P-519, type I or II, class 1.

101.14.1.2 Paper, tracing. Tracing paper for dimensioned drawings shall be in accordance with UU-P-561, Type as specified.

101.14.1.3 Film, Diazotype. Copies on sensitized, diazotype film shall be in accordance with L-F-340, Type and Class as specified.

101.14.1.4 Paper, Diazotype. Copies on direct-positive, sensitized (diazotype) paper shall be in accordance with UU-P-221.

101.14.2 Digital data. Engineering drawings prepared by other than manual means (such as computer generated drawings) shall provide all of the information required by the particular drawing type or level of design disclosure. Minor variations from the requirements as specified herein to accommodate document preparation will be acceptable so long as these variations meet the requirements relative to the information contents.

101.14.2.1 Plotters. If originals are maintained as digital data, copies resulting from electrostatic plotters need not meet the material, erasure and aging requirements of L-P-519 or UU-P-561.

101.14.2.2 Maintenance. Unless otherwise specified, requirements for erasure, aging and paper do not apply to associated lists prepared by automatic data processing, or drawings prepared and maintained as digital data.

101.14.2.3 Associated lists, materials. Associated lists prepared from digital data need not meet the requirements of 101.14.1.1 or 101.14.1.2.

101.14.2.4 Physical media. The physical media of digital product definition data shall conform to MIL-STD-1840.

101.14.2.5 Initial Graphics Exchange Specification (IGES). IGES data files shall be Class II application data subsets in conformance to MIL-D-28000 and MIL-STD-1840.

101.14.2.6 Raster data files. Raster data files shall be in accordance with MIL-R-28002 and MIL-STD-1840.

101.14.2.7 Standardized General Markup Language (SGML). SGML data files for predominantly textual engineering drawings shall be in conformance to MIL-M-28001 and MIL-STD-1840.

101.14.3 Preparation of duplicate original. Duplicate originals shall not be prepared for the purpose of maintaining duplicate records. Their application is limited to replacing missing original drawings.

101.15 Scale. Scale expresses the ratio of the size of the object as drawn to its full size. Drawings shall be drawn to a scale that depicts all details of the item clearly and accurately except as noted in 101.15.3.

101.15.1 Selection of scale. Drawings should show an object or assembly to full scale. When full scale is not practicable, drawings may be prepared to reduced or enlarged scale. It is desirable, whenever practicable, that detail drawings be prepared to the same scale as pertinent assembly drawings

101.15.2 Indication of scale. The scale or scales to which drawings are prepared shall be indicated in the drawing scale block. The scale to which the majority of views and sections are drawn shall be entered after "SCALE" in the space provided on each sheet of the drawing. The options for depicting scale, fraction, ratio, or decimal, are indicated as examples below. The scale of each view or section drawn to other than the predominate scale shall be entered directly below the title of the view or section, for example:

SECTION A-A or SECTION A-A or SECTION A-A
SCALE 1/2 SCALE 1:2 SCALE .5

101.15.3 Drawings not to scale. In the case of diagrams, pictorials, cable assemblies, tabulated and other drawings not prepared to any scale, the word "NONE" shall be entered after "SCALE" in the space provided on the drawing format. Drawings consisting predominantly of textual content need not have an entry in the scale block. Individual dimensions or illustrations on such drawings shall specify the applicable scale.

101.16 Drawing marking for item identification. Drawings shall specify marking requirements for items, including item identification, in accordance with Chapter 400 and MIL-STD-130.

101.16.1 Drawing requirements for part identification marking. Delineation of part identification markings on an associated drawing shall be consistent with the requirements of MIL-STD-130 and shall be clear on such detail as method of application (for example stamp or stencil), and materials (for example ink per A-A-208).

101.16.1.1 Identification marking location and size. The location and size (if necessary) of the identification marking shall be specified on the depiction of the item if it must be controlled due to functional or fit requirements or subsequent finish

application. The location shall be identified by a leader pointing to a chain line box or the actual information to be marked, indicating approximate marking location or, if necessary, by dimensionally locating the marking where it will be applied. The location of identification marking on items that are subsequently coated and finished shall also be controlled and should be specified on surfaces that are not subjected to the coating or finish.

101.16.1.2 Tags and plates. Tags and plates shall be separately defined as a part by applicable specification, standard or drawing. The requirements for attaching an identification plate shall be specified on the using assembly drawing. The information to be included on the identification plate or tag when installed in the using assembly shall be specified on the assembly drawing or, if applicable, on the identification plate drawing. The information to be included on the identification plate or tag when installed in the using assembly shall be specified on the assembly drawing.

101.16.1.3 Packaged items. Identification requirements for items which by their nature cannot be physically marked and are not permanently tagged or plate identified will be specified in accordance with MIL-STD-129.

101.16.1.4 Altered, selected, or source control item identification. Altered, selected, and source control items shall be identified in accordance with MIL-STD-130. When an item defined on a vendor item control drawing requires identification in addition to the manufacturer's part number an altered item drawing shall be prepared to specify the exact marking requirements.

101.16.1.5 Printed board assemblies. Drawings pertaining to printed board assemblies shall specify marking location, method, size, material, priority of markings specified and the extent of applicability of MIL-STD-1285, MIL-STD-2118, or ANSI/IPC-D-275, as applicable.

101.17 Optional/alternative designs. Optional/alternative designs of manufacturing a part, such as "casting" versus "weldment" may be specified. Where the differences between the designs would cause confusion in one set of views, an additional view or views shall be prepared with complete dimensional and other data specified thereon. The additional view or views shall be labeled "Optional Design" or "Alternative Design". Multiple sheet drawings shall be prepared when necessary.

101.18 Drawing notes. Drawing notes are used to provide information required to clarify the requirements for the item delineated. They apply to a portion of the drawing or to the entire drawing, providing additional treatment, finish, protection, and other considerations. The notes area of a drawing shall be identified with the heading "NOTES".

101.18.1 Language. Unless otherwise specified on contract or by international agreement, drawings and associated lists shall be in the English language. See 6.2.2.

101.18.1.1 Language style. Notes shall be concise statements using the simplest words and phrases for conveying the intended meaning. Notes shall not include contractual requirements such as statements of costs, time and place of delivery, methods of payment, requirements for submission, approval or distribution of data, reports or plans.

101.18.2 Commonly used words and phrases. Certain words and phrases are frequently used on a drawing. The following rules shall be applied:

a. Reference documents shall be cited as follows:

- (1) "...per..."
- (2) "...conforming to..."
- (3) "...as specified in..."
- (4) "...in accordance with..." or "...IAW..."

b. "Unless otherwise specified" shall be used to indicate the generally applied requirements. The phrase shall come at the beginning of the note or denoted at the head of the NOTES column. This phrase shall be used only when it is possible to clarify its meaning by providing a reference to another document, or requirement on the drawing, that clearly specifies the exception(s).

101.18.3 Use of "shall", "will", "should" and "may".

- a. "Shall". "Shall", the emphatic form of the verb, shall be used whenever a requirement is intended to express a provision that is contractually binding.
- b. "Will". "Will" may be used to express a declaration of purpose on the part of the Design Activity. It may be necessary to use "will" in cases when simple futurity is required.
- c. "Should" and "may". "Should" and "may" are used when it is necessary to express non-mandatory provisions.

101.18.4 Indefinite terms. Indefinite terms such as "and/or", "etc.", "e.g." and "i.e." shall not be used. On drawings, definite, precise language is imperative.

101.18.5 Location of notes. Notes shall be located on sheet one or reference shall be included on sheet one indicating note location, for example "SEE SEPARATE PARTS LIST FOR PARTS AND NOTES". When notes are continued beyond a given drawing sheet, information to that effect shall be inserted in the next note position of the applicable sheet, for example "NOTES CONTINUED ON SHEET 4".

101.18.5.1 Associated lists and drawings in book-form. For associated lists and drawings in book-form, the notes or textual data may be prepared and grouped on continuation sheet(s) of the drawing.

101.18.6 Drawing notes, contents. Drawing notes are pertinent data given in word form and used to complement the delineation of other given data. Drawing notes shall be concise, grammatically correct statements. The arrangement of the notes shall not be interpreted as an order of precedence, or sequence in manufacturing or assembly unless so specified on the drawing. The following shall be applicable in the preparation or use of notes:

- a. General notes apply to the entire drawing or associated list.
- b. Local notes are notes which are located at the specific area or point of application. Requirements specified by local notes apply only to the areas or points indicated.
- c. Flagnotes are notes which are located with the general notes but apply only at specific areas or points on the drawing. A flagnote shall be identified with a flagnote symbol in accordance with 101.18.6f. The flagnote symbol including the note number shall be shown at each point of application.
- d. General notes and flagnotes shall be numbered consecutively as a single listing starting with Note 1. Filling in voids (open spaces) to accommodate deletions is not required. Note numbers of deleted notes shall not be reused unless the identical note content is reused.
- e. Reference to standardization documents shall be by basic identifier, excluding revision letter, Preparing Activity suffix letters, "00" designation, and existing amendments except where identification of a specific issue is essential to drawing interpretation. Master Drawings prepared to ANSI/IPC-D-275 shall include fabrication specification identifier, document date, and applicable revision letter and amendment number. Reference to DoD

adopted non-Government standards shall be to the basic identifier, excluding revision level indicators or year of issue adopted, except where identification of specific issue is essential to drawing interpretation, as in the case of: ASME Y14.5M, ANSI/IEEE Std 91 and ANSI/AWS A2.4. Reference to non-Government standards that are not DoD-adopted shall include the year of the issue applicable. However, in the case of ASME Y14.5M, reference shall always include the year of issue, for example ASME Y14.5M-(enter the date of the ASME Y14.5M, applicable to the drawing in question).

f. Flagnote symbols, such as , or , or , are placed around the note number when the note number when the note is referenced in the field of the drawing. A flagnote need not be used when specific direction is given to a drawing note such as "(SEE NOTE 3)". The same flagnote symbol shall be used throughout the drawing. Careful consideration should be given to the use of flagnotes on intricate or cluttered drawings. Flagnote symbols shall not conflict with or resemble other symbols used on the drawing. Nonstandard symbols or annotations other than flagnotes shall be defined.

Examples, drawing notes:

 2 IN ACCORDANCE WITH MIL-R-55182

3. DIMENSIONAL LIMITS AND SURFACE TEXTURE APPLY WITHOUT PLATING.

 4 IN ACCORDANCE WITH WW-C-440

5. ITEM IDENTIFICATION: METAL STAMP, ENGRAVE OR ELECTRO-ETCH THE FOLLOWING MARKINGS IN ACCORDANCE WITH MIL-STD-130 IN .13 ± .02 CHARACTER HEIGHT:

19200-12300007
MFR

Examples in the field of the drawing:

RNL5Y 
CB1245L 

- g. A separate note shall be used for each, unrelated requirement to be specified in the drawing notes.
- h. Each drawing for which a separate Quality Assurance Provision (QAP) or equivalent document is prepared shall have the following note entered in the general note column. The QAP number specified shall be that associated with the item. See Appendix C.

QAP 12345XX8 APPLIES TO THIS ITEM.

- i. Reference to other documents for the purpose of specifying requirements or drawing interpretation shall be as specific as possible. The whole of a given document shall not be made applicable by reference unless all of its provisions are required. When a portion of a document is applicable, the extent of its applicability shall be stated. However, reference to paragraph numbers in other documents shall not be made. Reference shall be to a method, identified requirement, class, grade or type. Reference shall be made only to documents whose technical currentness and accuracy, and availability are assured.
- j. Parts and assemblies associated with Special Items and Processes shall be identified in accordance with 501. Drawing notes may provide the basis for the Special Item and Process or make direct or parenthetical reference to documentation that provides such information.

101.19 Drawing verification and approval. The design activity shall verify that engineering drawings and associated lists are technically accurate, in conformance with all requirements, and have been approved. Approval shall be signified in the signature block on the original by signature or approval indicator established by the design activity. An approval indicator may be any symbol adopted by the design activity. A signature or approval indicator may be either hand written or electronically affixed as long as it is unique to an individual, capable of verification, and under the individual's sole control. See also Appendix A.

101.20 Dating drawings. The method of specifying dates on drawings shall be numerical by year-month-day for entry in the DATE block. For example, June 10, 1989 would be indicated as 89-06-10 or 890610 or 89/06/10.

101.21 Reference identifiers. A reference identifier may be used to provide supplementary identification of an item that has been identified previously on the drawing or on a subordinate assembly. The use of reference identifiers shall be limited to instances that add substantially to drawing clarity. In order to differentiate from the

item identification callouts, the following format shall be used:

- a. Reference identifier shall be either the basic name or the basic name preceded by modifier(s) or part number as necessary (in instances where there are more than one part with the same basic name such as "PLATE" or "SCREW").
- b. Reference identifier shall be followed by the notation "REF".

Examples:

TRANSMISSION REF
FRONT BUMPER REF
12345678 REF

101.22 In-house peculiar information. Design activity identifying numbers may be indicated in brackets, [], to identify in-house peculiar identities. Engineering drawings and PLs using bracketed identification shall carry a note thereon indicating bracketed identities are for in-house information only.

NOTE: Documents identified as bracketed information are not considered as referenced documents as defined in 3.66 and, therefore, are not considered as part of the engineering drawing or design package.

101.23 Use of Government and non-Government standardization documents.

When the requirements in applicable standardization documents do not completely fulfill the design requirements of the item, engineering drawings may specify the requirements of the standardization document and the variations necessary to fulfill the design requirements of the item, in lieu of preparing new documentation.

101.24 Code Identification, FSCM and CAGE Code. Terms such as "FSCM" or "Code Identification" on existing documents or pre-prepared formats in stock need not be updated to "CAGE Code" or "CAGEC".

CHAPTER 200

TYPES OF ENGINEERING DRAWINGS

200. General. This chapter defines and illustrates the types of engineering drawings normally prepared by or for Departments and Agencies of the Department of Defense.

201. Associated lists. See Chapter 700.

202. Methods and styles.

202.1 Tabulation. Tabulation is the depiction on a drawing of a group of items having certain common characteristics and some variable features. Any type of drawing may be "tabulated" in order to delineate such similar items. Tabulation precludes the preparation of individual drawings for each item depicted. Each item included in the tabulation shall have a PIN assigned in accordance with 406.6. See Figure 200-1.

202.1.1 Tabulation requirements. The difference (variables) between the items on a given drawing shall be tabulated. The fixed (common) characteristics shall be depicted or stated once. Each item is uniquely identified by PIN. Normally, a pictorial representation of a single item is shown, with variable characteristics coded by means of letters used as headings for columns in the tabulation. The variables are entered in the table under the appropriate headings and on the same line as the unique identifier for the specific item. Alternate methods may be used to correlate the variations in characteristics to the individual items. The description of each tabulated item shall be as complete as that of an individual item described on the specific drawing type.

202.2 Drawings in book-form. Where it is advantageous to provide a given drawing type in the form of numerous small sheets, suitable for binding, a book-form format may be used. The format shall be in accordance with ASME Y14.1M or ASME Y14.1. Drawings in book-form shall not be used as a means of avoiding the development of formal standardization documents, such as Department of Defense specifications. The specifying of products in Department of Defense specification format shall be in accordance with MIL-STD-961.

202.2.1 Book-form requirements and limitations. Drawings in book-form shall use A, B, or G decimal-inch size sheets, or A4, A3, or A4X3 through A4X9 metric size sheets, and may include graphic delineations, textual data, tables and tabulations. A, B, and G decimal-inch size sheets may be intermingled, as may be A4, A3 and A4X3 through A4X9 metric size sheets on a single drawing. See Figures 200-2a and 2b for drawings in book-form, A size.

202.3 Combination of drawing types. The characteristics of more than one drawing type may be combined into a single drawing provided that the resulting combination includes the data required by the individual drawing types.

202.3.1 Application. Normally several types of engineering drawings and associated lists are required to completely define the end-product requirements of an item. As a minimum, a combination of detail and assembly drawings may suffice to define these requirements. However, as the complexity of the item increases, specialized engineering drawings may be required to provide for full engineering description. As a rule, combinations of detail, assembly, control, installation and diagrammatic drawings will provide the necessary engineering description. In certain cases, ancillary drawings (see 204.1) may be required for management control, logistic purposes, configuration management, manufacturing aids, and other unique functions as might be required by a design or procuring activity.

203. Pictorial drawings. When three dimensional depiction is specified instead of or as a supplement to multiview orthographic drawings, the required pictorial drawing shall be in accordance with ASME Y14.4M.

204. Drawing types. Drawing types shall be in accordance with ASME Y14.24M and 204.2.

204.1 Industry standard. The following drawing types shall be in accordance with ASME Y14.24M:

- Ancillary drawings (See Note 1)
- Layout drawing
- Detailed drawings: monodetail and multidetail
- Assembly drawing
- Modifying drawings: altered item and selected item and modification drawings
See Note 2.
- Arrangement drawing
- Installation drawing
- Control drawings: vendor item control drawings (formerly specification control drawing), source control drawing, interface control drawing, and identification cross reference drawing See Notes 3, 4, 5, 6, 7, and 8.

- Mechanical schematic diagram
- Electrical/electronic diagrams: functional block diagram, single line diagram, schematic or circuit diagram, connection or wiring diagram, interconnection diagram, wiring list, and logic circuit diagram
- Special application drawings: wiring harness drawing, cable assembly drawing, printed board drawing sets - assembly drawing, master drawing, and artwork master, undimensioned drawing, tube bend drawings - pictorial and tabular delineation, matched set drawing, kit drawing, and contour definition drawing
See Note 9.

NOTE 1: Ancillary drawings are other than end-product drawings used to supplement end-product requirements. Ancillary drawings do not establish item identification. These kinds of engineering drawings may be required for management control, logistic purposes, configuration management, manufacturing aids, and other functions unique to a design activity or manufacturer. Drawings of a general nature that describe unique data, processes, methods, heat treatment, protective finishes or special painting, shall be prepared as a general requirements drawing in either book-form or other format. See also 202.2.

NOTE 2: Engineering data, such as vendor item control or source control drawings, shall be submitted along with altered or selected item drawings, unless the item, prior to alteration or selection, is described in a military or non-Government standardization document. Military and non-Government standardization documents need not accompany submissions of altered or selected item drawings. If existing engineering data completely describing the item prior to alteration or selection is not available, then the delineation of the item on the altered or selected item drawing shall be of such detail as necessary to completely define the item requirements prior to alteration or selection.

NOTE 3: A Standardized Microcircuit Drawing (SMD) is a Government peculiar control drawing. See 204.2.3.

NOTE 4: Vendor item control drawings shall not be used to depict microcircuits (Federal Supply Class 5962) which comply with MIL-STD-883. Microcircuits compliant with MIL-STD-883 shall be depicted on an SMD. See 204.2.3.

NOTE 5: For vendor item control drawings, the manufacturer's part number shall be the PIN. See 408.10 and Note 2.

NOTE 6: Under certain contracts or purchase orders, Government design or procuring activity approval may be required for the preparation of Source Control Drawings. See

appendix D for Qualification Provisions as applied to Source Control Drawings where the Government Activity (Army, Navy, Air Force) is identified by CAGEC and Name in the title block or indicated as "CURRENT DESIGN ACTIVITY".

NOTE 7: Included on a source control drawing is a listing of approved sources of supply, their addresses, CAGE Code, and item identification for vendor items that have been qualified and approved for use in a specific application. The source control drawing number and applicable suffix identifiers establish the PIN. See 406.10, Note 1.

NOTE 8: Unless otherwise specified, the listing of manufacturing sources of supply on a source control drawing by a Government design activity is performed in accordance with Appendix D.

NOTE 9: See also 101.13.2 and 101.13.3 on Printed Board Drawing.

204.2 Government specific. The following drawing types (or variations thereof) describe program or Government specific requirements for drawing types.

204.2.1 Inseparable assembly drawing. An inseparable assembly drawing delineates items (pieces) which are separately fabricated and are permanently joined together (as in welded, brazed, riveted, sewed, glued or other processes) to form an integral unit (part) not normally capable of being disassembled for replacement or repair of the individual pieces. An inseparable assembly drawing may be prepared in lieu of individual monodetail drawings for inseparable (welded, brazed, bonded, riveted, sewn, glued or other processes) assemblies intended to be procured and replaced as a unit. Example: A welded or riveted bracket, a wood, metal or plastic chest, or a canvas case may be covered by an inseparable assembly drawing without separate detail drawings. See Figure 200-3 for an Inseparable Assembly Drawing and ASME Y14.24M regarding Assembly Drawing.

204.2.1.1 Inseparable assembly drawing requirements. An inseparable assembly drawing shall fully define the end-product as assembled. Pieces of the inseparable assembly may be detailed either on separate detail drawings or on the inseparable assembly drawing itself.

204.2.2 Envelope drawing. An envelope drawing depicts an item in a development (privately or Government) or pre-production stage. Accordingly, features not shown on the drawing are left to the ingenuity of the producer in meeting the performance, design and, installation requirements that are indicated. Envelope drawings do not establish item identification. When item development is completed, envelope drawings shall

evolve into detail drawings, specifications, or vendor item or source control drawings, as applicable. The notation "ENVELOPE DRAWING" shall be placed above the title block. See Figure 200-4.

204.2.3 Standardized microcircuit drawing. An SMD is a control drawing, and shall disclose the applicable configuration, envelope dimensions, mounting and mating dimensions, interface dimensional characteristics, specified performance requirements, nuclear effects, and inspection and acceptance test requirements for microcircuits in a military application. Guidance concerning SMDs is contained in MIL-HDBK-780. See Figure 200-5.

204.2.3.1 SMD requirement. A SMD shall depict Government requirements for existing commercial items in terms of performance, screening, and testing for military application.

204.2.3.2 SMD limitation. A SMD shall be prepared in lieu of source control and vendor item control drawings for microcircuits compliant with MIL-STD-883.

204.2.4 Combination of adopted items drawing. A combination of adopted items drawing depicts the items constituting a combination of items and assigns a unique identification number to the combination. The drawing serves as the basic document for assignment of a stock number to the combination. See Figure 200-6.

204.2.4.1 Combination of adopted items drawing requirements. Entries on the drawing shall be in accordance with lettering requirements of 101.2. Entries in each column shall be as follows:

- a. **NATIONAL STOCK NUMBER (NSN):** Self Explanatory. If no NSN exists, enter "NONE". If an NSN exists but does not apply enter "NOT APPLICABLE".
- b. **COMBINATION OF ADOPTED ITEMS:** The necessary description of the combination of adopted items represented by the drawing shall be entered in the "Combination of Adopted Items" column. The first and main entry shall be the necessary description of the combination of adopted items for which the drawing is prepared. The words "COMPOSED OF:" shall be entered below the first entry. The items contained in the combination described in the first entry shall then be listed by complete nomenclature. The quantity of each item, listed below the words "COMPOSED OF:" necessary to complete one unit of the combination shall precede the description of each item.

- c. **CAGE CODE:** The CAGE Code of the design activity whose PIN is assigned to the item(s) listed. If the CAGE Code is the same as that in the drawing title block, it may be omitted.
- d. **PIN:** The PIN(s) of the item(s) listed. If no PIN exists, enter "NONE".

204.2.5 Package content drawing. A package content drawing is a drawing prepared to provide a package PIN and appropriate package nomenclature for stock identification of military materiel packaged for convenience of handling, storage, issue, or functional selectivity in logistic support operations. Package content drawings are prepared for that packaging which constitutes a synthetic grouping or combination of items, which in themselves do not constitute a functioning, engineering, or production assembly. Representative examples of such groupings are engine and container units. See Figure 200-7.

204.2.5.1 Package content drawing requirements. Entries on the drawing shall be in accordance with the lettering requirements of 101.2. Entries shall be as follows:

- a. **PACKAGE STOCK NO.:** The National Stock Number assigned to the package.
- b. **PACKAGE NOMENCLATURE:** The nomenclature of the package.
- c. **THIS PACKAGE PERTAINS TO:** The nomenclature and model number or, if model number does not apply, the part number of the system/subsystem to which the package applies.
- d. **QTY:** The quantity of each item which is necessary to make up one unit of the package.
- e. **NAME OF ITEM:** Nomenclature of each item contained in the package.
- f. **DWG NO.:** The drawing number of each item listed.
- g. **CAGE CODE:** The CAGE Code assigned to the drawing for the items listed. If the CAGE Code is the same as that in the drawing title block it may be omitted here.
- h. **PIN:** The PIN of each item listed.
- i. **STOCK NUMBER:** The National Stock Number of each item listed. If no Stock Number exists, leave blank.

j. **TITLE BLOCK:** The nomenclature of the package contents drawing.

204.2.6 Software and firmware data. Drawings defining software, such as instructions or data that will be or is intended to be resident in a memory device or other type of media which becomes part of the end-item, shall be prepared as either a Software Installation Drawing or Altered Item Drawing to be determined by whether the software is one-time programmable or multi-programmable.

204.2.6.1 Memory device categories. For the purposes of this standard, memory devices are categorized as being either one-time programmable or multi-programmable.

- a. One-time programmable memory devices shall be documented using the requirements of the Altered Item Drawing.
- b. Multi-programmable memory devices shall be documented using the requirements of the Software Installation Drawing.

204.2.6.2 Software installation drawing. A software installation drawing identifies the characteristics of the software, instructions for programming into the memory device, its master media and physical location. Software programs shall be identified by reference to PINs within the drawing form rather than identification by truth tables. This drawing type does not establish item identification. See Figure 200-8.

204.2.6.2.1 Application. A software installation drawing is prepared when it is necessary to define the characteristics of the software, instructions for programming into a memory device, its master media and physical location.

204.2.6.2.2 Software installation drawing requirements. The drawing shall identify:

- a. identification of the item to be programmed by referencing the original vendor's part number or by providing complete description of the item or by vendor item control drawing or source control drawing if a nationally recognized standard or SMD is not available,
- b. PIN of the software, software version and other characteristics such as operating system and version, programming language used, source file identification and version, object file identification and version,
- c. physical location of the master software or data. Name and address reference will be made or CAGE Code of the repository having custody of the master software programs or data required to program items,

- d. detailed instructions needed to load software into an item,
- e. acceptance requirements in the form of a test procedure or checksum.

204.2.6.3 Assemblies containing multi-programmable devices. Software or data that is programmed into a device at a higher level of assembly shall be documented using software installation drawing requirements. The device shall not be reidentified due to programming or loading.

204.2.6.4 Altered item drawing (one-time programmable devices and multi-programmable devices used as one time programmable). Drawings describing the programming requirements of a one-time programmable device shall be prepared as Altered Item Drawings. This type drawing shall be prepared only for those devices that are permanently altered prior to installation into a higher level of assembly.

204.2.6.4.1 Altered item drawing (one-time programmable devices and media) requirements. The requirements for Altered Item Drawings shall be in accordance with the requirements herein and the following:

- a. identification of the item to be programmed by providing complete description of the item or by vendor item control drawing or source control drawing if a nationally recognized standard or SMD is not available,
- b. PIN of the software, software version and other characteristics such as operating system and version, programming language used, source file identification and version, object file identification and version,
- c. physical location of the master software or data. Name and address reference will be made or CAGE Code of the repository having custody of the master software programs or data required to program items,
- d. detailed instructions needed to load software into an item,
- e. acceptance requirements in the form of a test procedure or checksum,
- f. altered item identification marking requirements.

204.2.7 Camouflage basis drawing. A camouflage basis drawing graphically depicts the exterior configuration (outline) of an item that requires a camouflage pattern. It provides a baseline configuration for the design of the camouflage pattern. See 204.2.8.

204.2.7.1 Camouflage basis drawing requirements. A camouflage basis drawing is a multiview orthographic or pictorial depiction that includes the following requirements and information as a minimum.

a. Drawings shall depict the following views, as required:

(1) Back

(2) Front

(3) Top

(4) Right Side

(5) Left Side

(6) Bottom

(7) All hidden views, including open position of hatches and doors.

b. The drawing scale is dependent upon the actual size of the item as follows:

(1) Items whose overall length is 7.5 meters or less, the drawing scale shall be 1/8.

(2) Items whose overall length is greater than 7.5 meters, the drawing scale shall be 1/10.

c. Drawing sheet size shall be "D" or "E" in accordance with ASME Y14.1 or "A1" or "A0" in accordance with ASME Y14.1M.

d. Depictional detail shall be sufficiently accurate to locate all item features that exceed 25mm².

e. All hatches or doors or other moveable items that could be left in the open position during operating mode shall be shown in both the open and the closed position. Items shall be shown in operational position.

f. All items and features not to be painted shall be identified.

g. All items and surfaces that will exceed 200 $^{\circ}$ C shall be identified.

204.2.8 Camouflage pattern drawing. The camouflage pattern drawing depicts the requirements for the contrasting color bands and patches applied over a base color to disrupt the silhouette of an item as observed from 500 meters and beyond. Design of the pattern is the responsibility of the Government. Changes or adjustments to the pattern requires approval of the Government design or procuring activity. See Figure 200-9.

204.2.8.1 Camouflage pattern drawing requirements. The camouflage pattern drawing shall describe the pattern designed by a Government design activity. The following requirements shall be included:

- a. The location and size dimensions for bands as required.
- b. Notes as required.
- c. Marking style, size, location, and color of paint to be applied.
- d. Identification of all items and surfaces not to be painted.
- e. Finish requirements and special coatings.
- f. Camouflage pattern application inspection requirements.

204.2.9 Transportability drawing. A transportability drawing contains data that will assist in preparing an item or major system for shipment. See Figure 200-10. It shall describe the following:

- a. The configurations in which the item or system will be shipped. This includes the shipping envelope; any modifications thereto necessary or possible for envelope reduction or safety; weights and weight distribution data; tie down and lifting point locations and loading information.

- b. The modes of transportation used to transport the item or system. This includes applicable carrier data and any pertinent information about access, egress clearance, and loading.

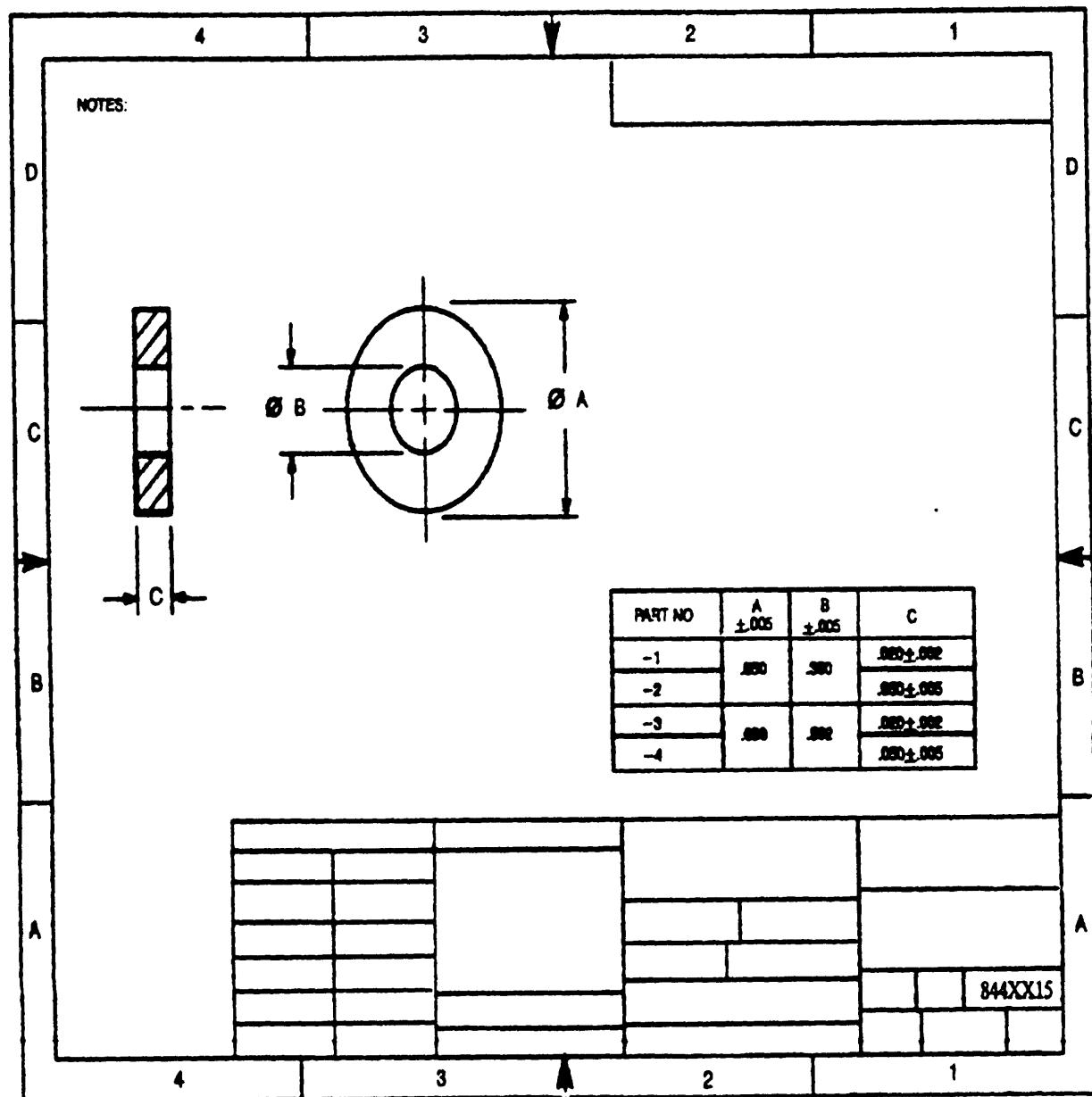


Figure 200-1. Tabulation.

This Figure is informational only and complete to the degree necessary to illustrate tabulation. Actual format and drawing shall conform to the textual requirements set forth in this standard.

Figure 200-2a. Drawing in book-form (title sheet).

This sample drawing is informational only and complete to the degree necessary to illustrate a drawing in book-form. Actual format and drawing shall conform to the textual requirements set forth in this standard.

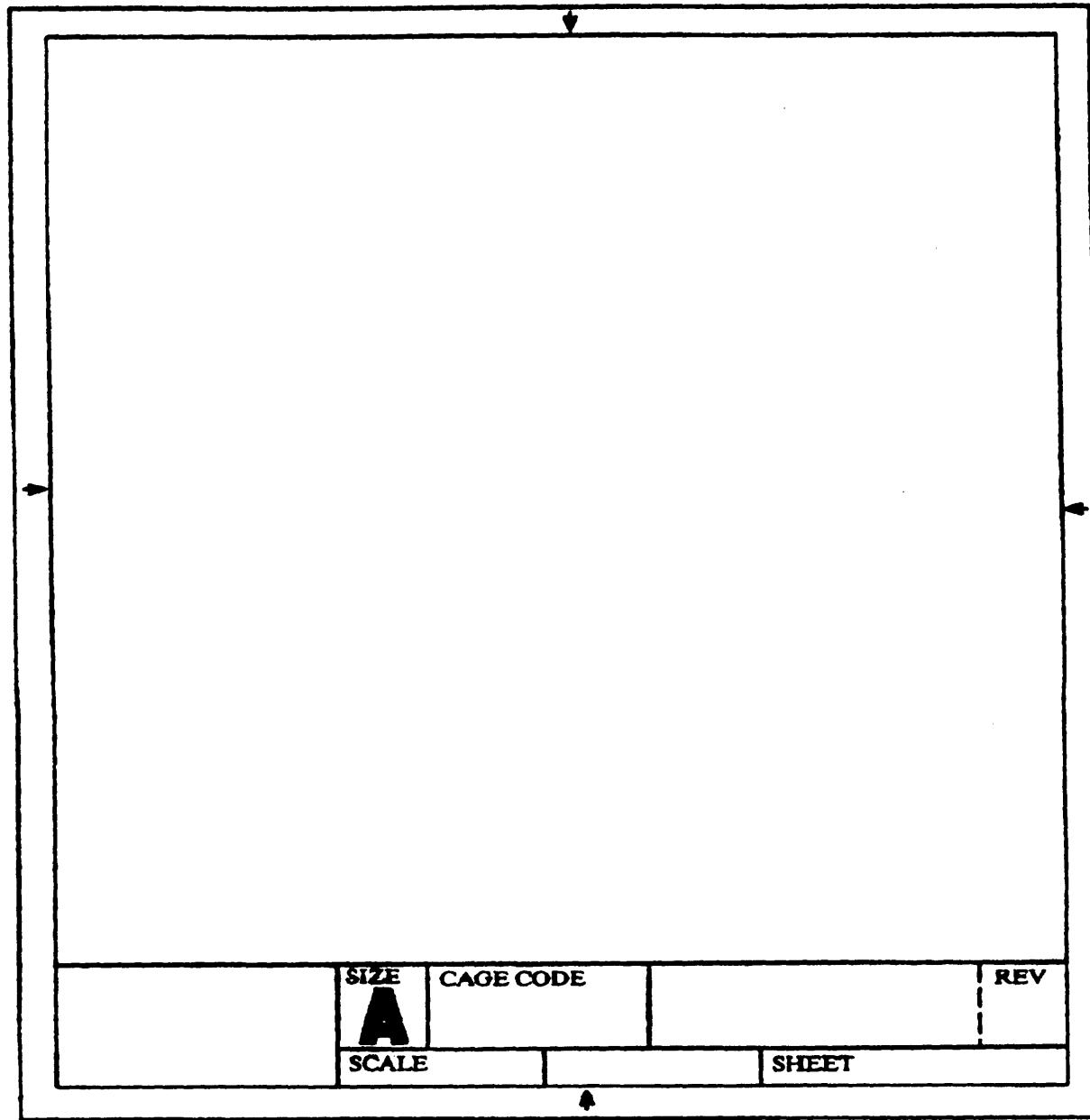


Figure 200-2b. Drawing in book-form (continuation sheet).

This sample drawing is informational only and complete to the degree necessary to illustrate a drawing in book-form. Actual format and drawing shall conform to the textual requirements set forth in this standard.

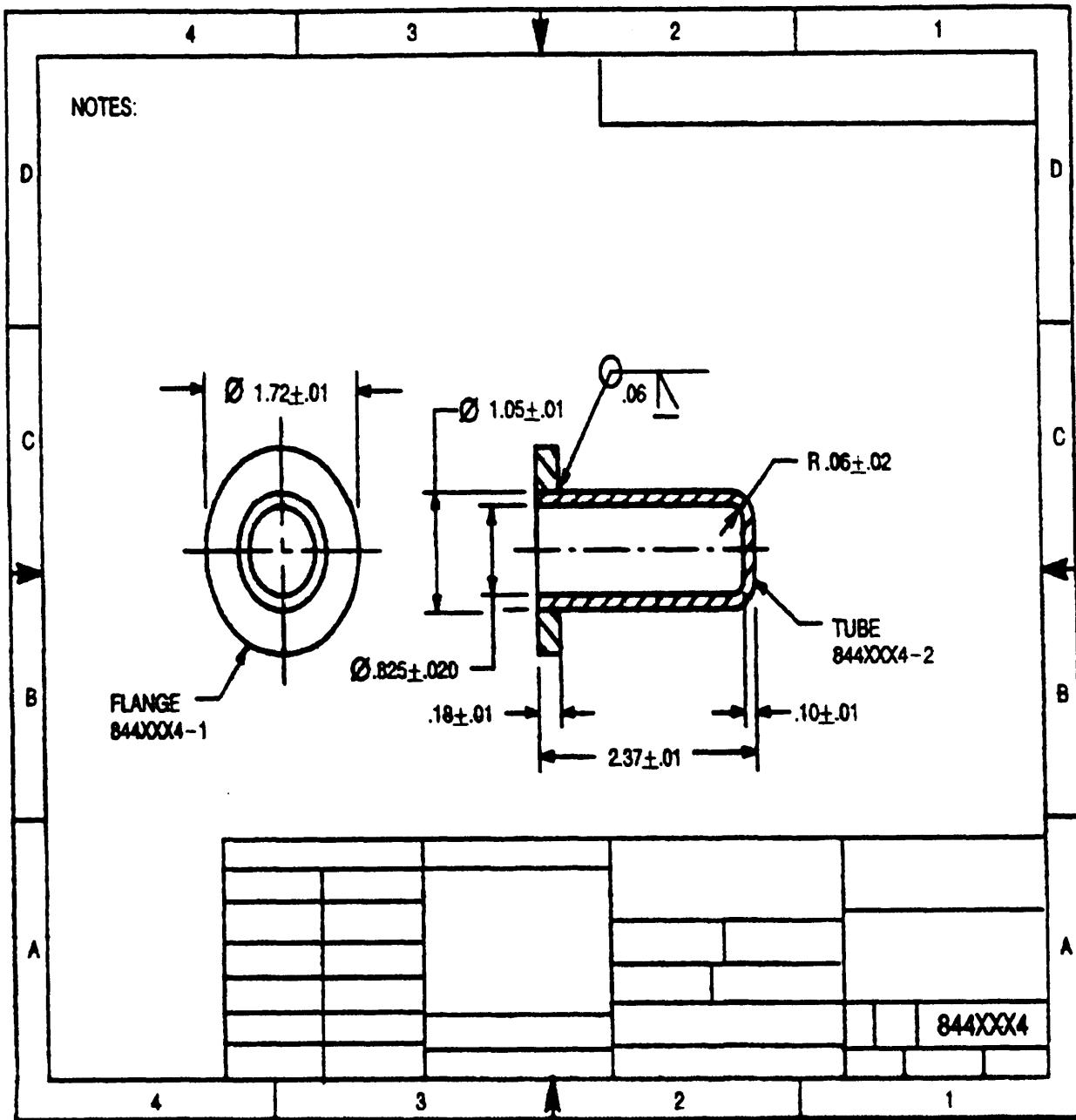


Figure 200-3. Inseparable assembly drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

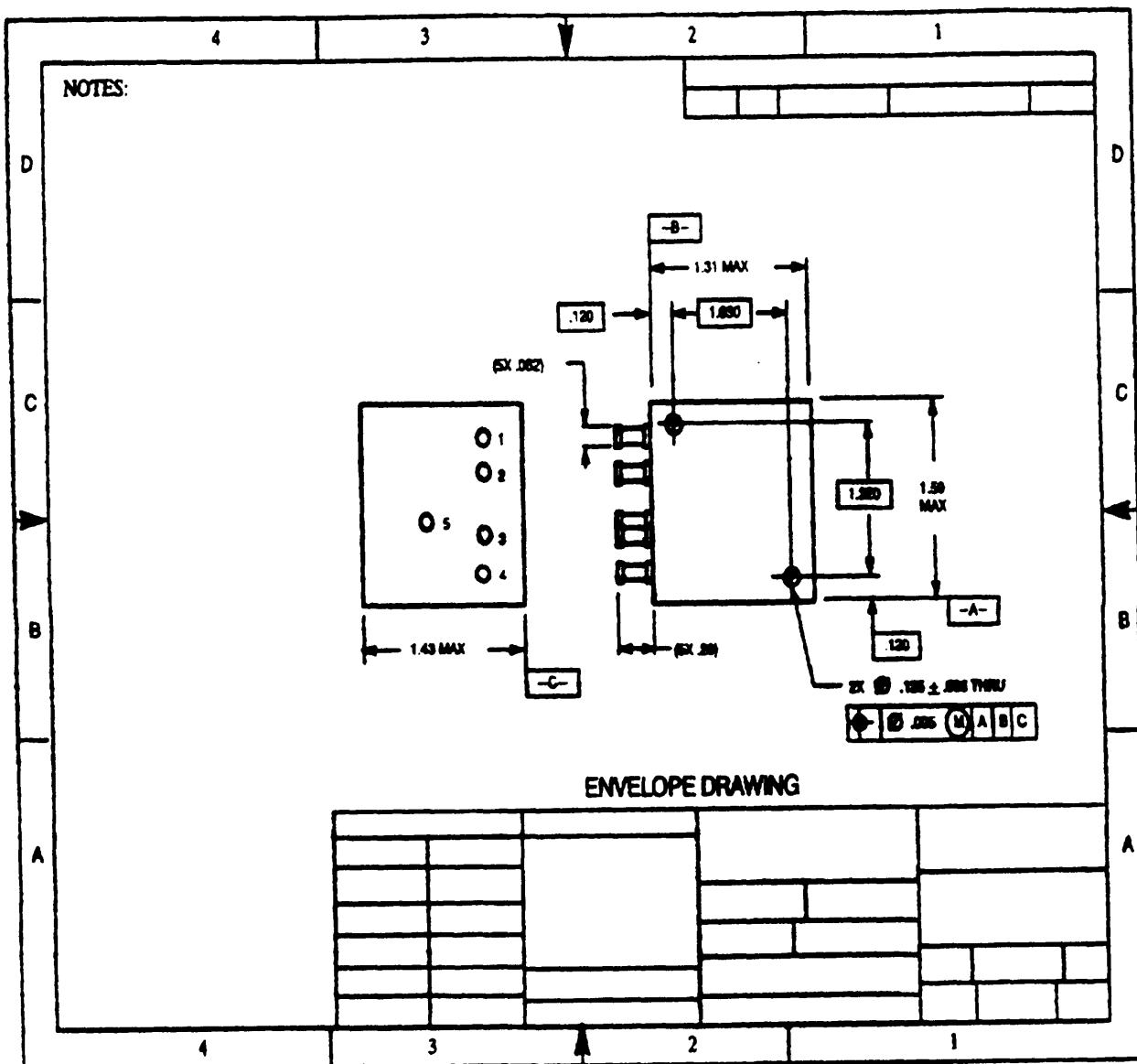


Figure 200-4. Envelope drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
REV			
SHEET			
REV			
SHEET			
REV STATUS OF SHEETS	REV SHEET		
PMIC N/A	PREPARED BY	DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO 45444	
STANDARDIZED MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	CHECKED BY		
	APPROVED BY		
	DRAWING APPROVAL DATE		
	REVISION LEVEL		
SHEET	SIZE A	CAGE CODE 67268	5962-XXXX
			OF

DESC FORM 193

JUL 91

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5962-XXXX-YY

Figure 200-5a. Standardized microcircuit drawing title sheet.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

<p>STANDARDIZED MICROCIRCUIT DRAWING DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO 45444</p>	<p>SIZE A</p>		<p>5962-XXXX</p>
		<p>REVISION LEVEL</p>	<p>SHEET XX</p>

DESC FORM 193A
JUL 91

Figure 200-5b. Standardized microcircuit drawing continuation sheet.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

NATIONAL STOCK NUMBERS	COMBINATION OF ADOPTED ITEMS	CAGE CODE	PART OR IDENTIFYING NUMBER			
S2XX-X1-24X-38XX	CARTRIDGE, 25 mm, HEI-T, M792 WITH M28 LINKS, PACKED IN CNU-405 CONTAINER COMPOSED OF: 1 - CARTRIDGE, 25 mm, HEI-T, M792	19203	125XXX80 120XXX30			
NOT APPLICABLE	1 - LINK ASSEMBLY, 25 mm, M28, 55 LINKED CARTRIDGES	19207	120XXX13			
NOT APPLICABLE	METHOD OF PACKING 55 CARTRIDGES 25 mm, IN CNU-405 METAL CONTAINER	19207	96XXXX06			
		CONTRACT NUMBER	DESIGN ACTIVITY			
REVISIONS		CONTRACTOR	COMBINATIONS OF ADOPTED ITEMS			
LTR	DESCRIPTION			DATE (YR-MO-DY)	APPD	
				DRAWN BY	DATE (YR-MO-DY)	
				CHECKER	ENGINEER	
DRAWING APPROVAL						
DESIGN APPROVAL						
				SIZE	CAGE CODE	125XXX80
				UNIT WT	SHEET	

Figure 200-6. Combination of adopted items drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

PACKAGE CONTENTS

QTY	NAME OF ITEM	DWG NO.	CAGE CODE	PART NO	STOCK NO.
1	MOUNT, MACHINE GUN	120XXXX1	19XXX	120XXXX1	1005-00-0XX-2XX4
1	SPENT BRASS BAG SUPPORT HARDWARE KIT	122XXXX2	19XXX	122XXXX2	
1	HARDWARE AND ACCESSORIES KIT	122XXXX3	19XXX	122XXXX3	

				CONTRACT NUMBER		DESIGN ACTIVITY	
REVISIONS				CONTRACTOR			
LTR	DESCRIPTION	DATE (YR-MO-DY)	APPD	DRAWN BY	DATE (YR-MO-DY)		
				CHECKER	ENGINEER		
				DRAWING APPROVAL		SIZE	CAGE CODE
				DESIGN APPROVAL		UNIT WT SHEET	

Figure 200-7. Package content drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

4	3	2	1											
D				D										
C				C										
B				B										
A				A										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%;">PART OR IDENTIFYING NUMBER (PIN) OF BLANK MEDIA</th> <th style="width: 20%;">SOURCE FILE (SEE NOTE 2)</th> <th style="width: 20%;">OBJECT FILE (SEE NOTE 2)</th> <th style="width: 20%;">CHECKSUM</th> <th style="width: 20%;">PROGRAM PACKAGE DOCUMENT (PPD)</th> </tr> <tr> <td>CY7C341-25RC</td> <td>[XXXXX_01.LSB]</td> <td>[XXXXX_01.SRC]</td> <td>5FC6F</td> <td>[2022444]</td> </tr> </table>					PART OR IDENTIFYING NUMBER (PIN) OF BLANK MEDIA	SOURCE FILE (SEE NOTE 2)	OBJECT FILE (SEE NOTE 2)	CHECKSUM	PROGRAM PACKAGE DOCUMENT (PPD)	CY7C341-25RC	[XXXXX_01.LSB]	[XXXXX_01.SRC]	5FC6F	[2022444]
PART OR IDENTIFYING NUMBER (PIN) OF BLANK MEDIA	SOURCE FILE (SEE NOTE 2)	OBJECT FILE (SEE NOTE 2)	CHECKSUM	PROGRAM PACKAGE DOCUMENT (PPD)										
CY7C341-25RC	[XXXXX_01.LSB]	[XXXXX_01.SRC]	5FC6F	[2022444]										
<p>NOTES:</p> <ol style="list-style-type: none"> 1. DRAWING IAW MIL-STD-100 2. LOCATION OF THE SOURCE AND OBJECT FILE IS: (NAME AND ADDRESS OF CUSTO- DIAN) 3. VERIFICATION OF PROGRAMMED DEVICE MAY BE ACCOMPLISHED BY LISTING THE CODE FROM THE DEVICE AND VERIFYING TO THE DATA/CHECKSUM. 4. LOAD PROGRAM OR DATA USING DATA I/O UNISITE PROGRAMMER VERSION 4.7 (OR EQUIVALENT) IAW XXXXXXXXXX. 5. DOCUMENTS IDENTIFIED WITH BRACKETS ARE CONSIDERED REFERENCE DOC- MENTS AND ARE NOT CONSIDERED PART OF THE ENGINEERING DRAWING PACKAGE. 														
4	3	2	1											

Figure 200-8. Software installation drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

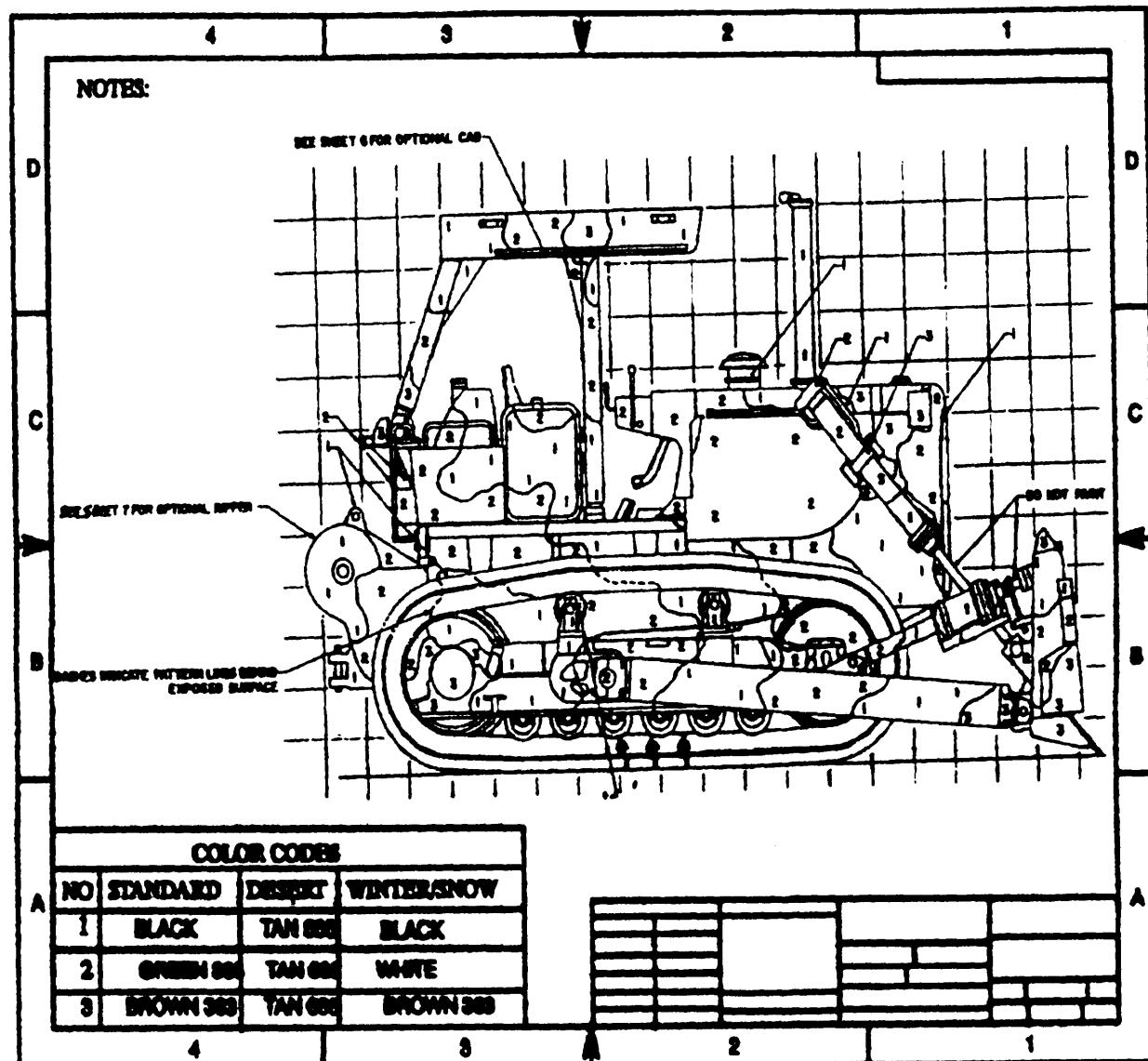


Figure 200-9. Camouflage pattern drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.

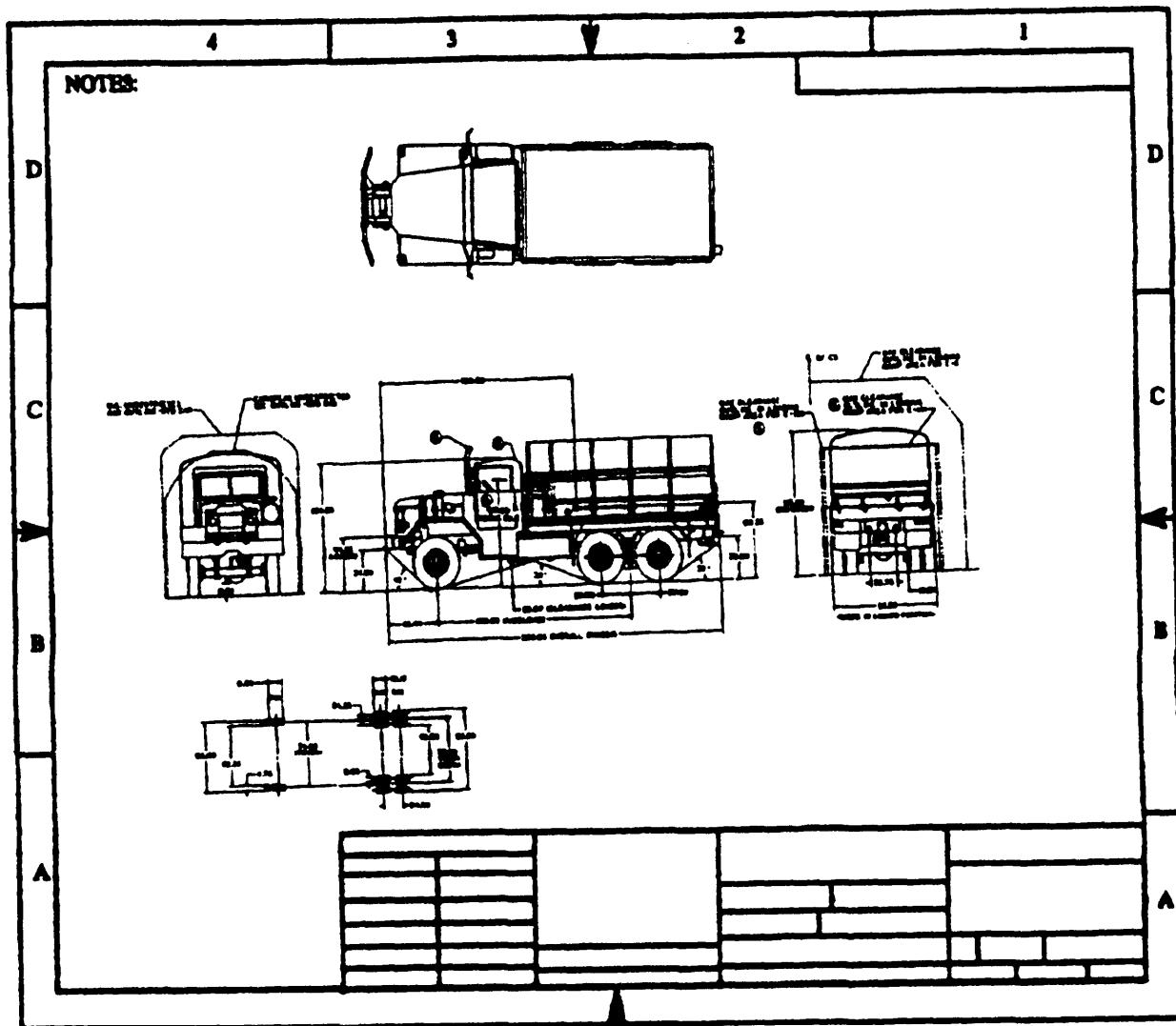


Figure 200-10. Transportability drawing.

This sample drawing is informational only and complete to the degree necessary to illustrate a type of drawing. Actual format and drawing shall conform to the textual requirements set forth in this standard.



CHAPTER 300

DRAWING TITLES

300. General. This chapter establishes procedures for creating titles for engineering drawings and names for items detailed thereon.

301. Drawing title. The drawing title shall be the name by which the part or item will be known and shall consist of a basic item name, Government type designator, if applicable, and sufficient modifiers to differentiate like items in the same major assembly. Reference to major assemblies or end items shall not be included as part of the drawing title for subassemblies and parts except when necessary to differentiate such items from similar items.

301.1 Approved item names. Approved item names are those item names listed in Cataloging Handbook H6, Federal Item Name Directory for Supply Cataloging. Approved item names are preferred for use in drawing titles. Item names not listed in H6 should be submitted, through the Government design or procuring activity, to the Defense Logistics Services Center (DLSC) for approval.

301.2 Type designators. Type designators, a combination of letters and/or numbers assigned by the Government for the purpose of item identification, are assigned in accordance with approved type designator - nomenclature systems such as:

Joint Electronics Type Designation System	MIL-STD-196
Army Nomenclature System	MIL-STD-1464
Mark and Mod Nomenclature System	MIL-STD-1661
Type Designation, Assignment and Method of Obtaining	MIL-STD-1812

301.3 Assembly. The term ASSEMBLY when used as a part of the drawing title shall conform to the definition contained in 3.7 and meet the requirements of Cataloging Handbook H6.

302. Procedures for creating drawing titles. Titles for drawings requiring modifiers shall be in two parts. The first part shall be the name. The second part shall consist of

those additional modifiers and Government type designators necessary to complete the identification of the item.

302.1 General rules. The following rules apply to all drawing titles:

- a. No abbreviations of any portion of the name (first part of the title) shall be made, except those necessarily used trademarked names and the words ASSEMBLY (ASSY), SUBASSEMBLY (SUBASSY), OR INSTALLATION (INSTL). Abbreviations may be used in the second part of the title. Approved abbreviations are listed in MIL-STD-12. In general, the use of abbreviations should be avoided.
- b. Titles of subassembly and detail drawings shall be consistent with the titles of the next assembly drawings, except where interchangeability of parts between assemblies makes consistency impractical or is prohibited by the Government design or procuring activity, or when such use limits application. The drawing title shall be shown in uppercase letters.
- c. When a drawing is prepared to replace an existing drawing with a different number and the title of the drawing being replaced is in accordance with instructions contained herein, the same title shall be used. When the title of the drawing being replaced is not in accordance with these instructions, a new drawing title shall be developed.
- d. A drawing title shall be as brief and simple as possible, shall describe the item and shall distinguish between similar items.
- e. The names of parts detailed on a drawing shall consist of a noun or noun phrase. Modifiers may be used to distinguish between parts on the same drawing.
- f. For words with dual or multiple definitions, the Military definitions as published in the Federal Item Name Directory for Supply Cataloging, Section A, Cataloging Handbook H6 shall have precedence.
- g. If the drawing title appears on each sheet of a multisheet drawing, the exact same title shall appear on all sheets.

302.2 First part of title. The first part of the title shall be one of the following in order of preference.

- a. An approved item name selected from the Federal Item Name Directory for Supply Cataloging, Section A, Cataloging Handbook H6, whose definition describes the item ("PIN, STRAIGHT, HEADED", "SPRING, HELICAL, COMPRESSION", "ENGINE, GASOLINE", "RIB, WING SECTION, INNER", "MODIFICATION KIT, RIFLE RACKS, MOUNTING")
- b. Where the procedure outlined in 302.2a does not provide a suitable name, the following procedures shall be followed:
 - (1) The basic name shall be a noun or noun phrase. Modifiers shall be included as required by 302.2c.
 - (2) This noun or noun phrase shall establish a basic concept of an item. A compound noun or noun phrase shall be used only when a single noun is not adequate to establish a basic concept of an item. Cataloging Handbook H6 shall be used as a guide in establishing the noun or noun phrase.
 - (3) The noun or noun phrase shall describe the part and the usage of the part, and not the material or method of fabrication. A noun such as "casting", "forging", or "weldment" shall not be used except when a casting, forging or weldment shall be subject to further fabrication to make the designed part. In lieu of such a name, a noun or noun phrase shall be assigned which indicates what the item is or what it does, for example, "BRACKET" in the title "BRACKET, SUPPORT MIXING VALVE."
 - (4) The noun or noun phrase shall be used in singular form, except as follows:
 - (a) Where the only form of the noun is plural, as in, "TONGS".
 - (b) Where the nature of the item requires the plural form, such as in "CLIMBERS" or "GLOVES".
 - (c) Multiple single items appearing on the same drawing, as in "Fuses", "Connectors", or "Fasteners".
 - (5) The word "ASSEMBLY" shall be used in names selected from Cataloging Handbook H6 exactly as published therein ("CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL"). When no applicable name

appears in Cataloging Handbook H6 the word "ASSEMBLY" shall be used as the last word of the noun phrase ("INTAKE-MANIFOLD ASSEMBLY, GASOLINE ENGINE").

(6) An ambiguous noun, or one which designates several classes of items, shall not be used alone but may be used as part of a noun phrase.

Example:

<u>Acceptable</u>	<u>Unacceptable</u>
SLIDE RULE	RULE, SLIDE
SOLDERING IRON	IRON, SOLDERING
CIRCUIT CARD ASSEMBLY	ASSEMBLY, CIRCUIT
PRINTED WIRING BOARD	CARD BOARD, PRINTED WIRING
PRINTED CIRCUIT BOARD	BOARD, PRINTED CIRCUIT

NOTE: One of the most difficult tasks in naming any item is the determination as to when a noun should be qualified as being ambiguous. The general rule quoted above is amplified to some extent in the succeeding paragraph. When a noun does not expressly fit under any of these rules, one step in determining whether the selected noun is or is not ambiguous, is to refer to Cataloging Handbook H6 to see if it is listed. For example, if there is a question on the noun "plate", a review of the index will reveal many item names with the noun "plate" used, indicating the noun is not considered as being ambiguous.

(7) A trade-marked or copyrighted name shall not be used as the noun or noun phrase except where the technical name is extremely difficult ("FREON 12" rather than "DICHLORODIFLUOROMETHANE") or where no other name is available.

(8) When an item is not a container or material, but its name involves the use of a noun which ordinarily designates a container or material, a noun phrase shall be used as the basic name.

Examples:

<u>Acceptable</u>	<u>Unacceptable</u>
JUNCTION BOX	BOX, JUNCTION
CABLE DRUM	DRUM, CABLE
SOLDERING IRON	IRON, SOLDERING

(9) The following words shall never be used alone but may be the last word of a noun phrase:

Apparatus	Equipment	Plant
Assembly	Group	Ship
Assortment	Installation	Subassembly
Attachment	Kit	Tackle
Compound	Machine	Tool
Device	Mechanism	Unit
Element	Outfit	Vehicle

EXAMPLE: In certain instances, some of the listed words may be used as the first word in a basic noun phrase, as in "MACHINE SHOP" or "TOOL KIT".

c. When the noun or noun phrase represents an item to which types, grades, or varieties are applicable, the remainder of the first part of the title shall consist of one or more modifiers.

- (1) A modifier may be a single word or a qualifying phrase. The first modifier shall serve to narrow the area of concept established by the basic name and succeeding modifiers must continue a narrowing of item concept by expressing more particular characteristics. A word qualifying a modifying word shall precede the word it qualifies, thereby forming a modifying phrase ("BRACKET, UTILITY LIGHT"). It is to be noted the word "UTILITY" qualifies the word "LIGHT" and precedes it in the modifying phrase.
- (2) A modifier shall be separated from the noun or noun phrase by a comma and from any preceding modifier by a comma. The hyphen in compound words and the dash in type designators are not punctuation marks.
- (3) The conjunction "or" and the preposition "for" shall not be used.
- (4) The first part of the title shall be separated from the second part of the title by a dash

302.3 Second part of title. The second part of the title shall consist of such additional modifiers, modifying phrases, or Government type designators as required. Modifiers indicating what an item is (its shape, structure, or form) or what the item does (its function) are preferable to modifiers indicating the application (what it is used for) or location of the item (where it is used)

Example:

SPRING, HELICAL COMPRESSION - **RECOIL ADAPTER**

First Part of Title

Second Part of Title

- a. When two or more drawings are similar, and the parts detailed on them perform the same general function, they shall be distinguished by additional modifiers indicating their location, relative position, forms, or dimensions, for example: RIB, WING SECTION, INNER-STATION 276.
- b. Nonpart drawings (such as schematic and wiring diagrams) should include the drawing type in the second part of the drawing title, for example: AMPLIFIER, FIRE CONTROL - SCHEMATIC DIAGRAM.

303. Disclosure of security categories. No word(s), symbol(s), nor any of their possible combinations which would disclose information in any of the established security categories, shall be used in drawing titles. See Appendix B.

CHAPTER 400

NUMBERING, CODING AND IDENTIFICATION

400. General. This chapter establishes numbering, coding, and identification procedures for engineering drawings, associated lists, and documents referenced thereon. It also provides identification direction for parts, materials, processes, and treatments specified on these engineering drawings and associated lists.

401. Commercial and Government Entity Code (CAGE Code). The CAGE Code is a five-position code, of numeric or alphanumeric characters, applicable to activities which have designed, produced or are producing or supplying items used by the Government. It also applies to Government activities which control design, or are responsible for the development of certain specifications, drawings or standards which control the design of items. These codes are assigned in conformance with CAGE Cataloging Handbook, H4/H8. Activities not assigned a CAGE Code shall request such identification in conformance with the CAGE Cataloging Handbooks. Organizations which neither manufacture nor control design, such as dealers, agents or vendors of items produced by others, are assigned type "F" CAGE Codes and shall not be included as a design activity on a drawing. Type "A" CAGE Codes, for manufacturers, are applicable for use on drawings. CAGE Codes shall be entered in the appropriate block of the engineering drawing or associated list format and shall be preceded by the phrase "CAGE CODE". If necessary, because of space limitations, the phrase "CAGEC" may be used.

402. Drawing number. The drawing number consists of letters, numbers or combination of letters and numbers, which may or may not be separated by dashes. The number assigned to a particular drawing and the CAGE Code provide a unique drawing identification. The drawing number shall be assigned from numbers controlled by the design activity whose CAGE Code is assigned to the drawing.

403. Drawing identification. The drawing number and original design activity CAGE Code establish a drawing identification that shall be unique to that drawing. The relationship of drawing number and original design activity CAGE Code is inviolate, providing for drawing identification regardless of drawing ownership, design responsibility, adding of sheets, or current design activity. See 6.4.

404. Part or identifying number. The Part or Identifying Number (PIN) shall consist of letters, numbers or combinations of letters and numbers, which may or may not be separated by dashes or slashes that are assigned to uniquely identify a specific item. The PIN shall be or shall include the design activity drawing number, and may include a suffix identifier (if applicable). (See 406.6.). The PIN assigned to a specific item and the CAGE Code assigned to the drawing provide the basis for unique item identification.

405. Find number. A find number may be assigned to an item for the purpose of cross-referencing an item identified in a Parts List (PL) or table on the drawing to the location of the item in the field of the drawing, in lieu of using the PIN in the field of the drawing. The use of find numbers or direct reference to PINs is an option. However, the option selected should be applied consistently throughout any given drawing. Item identifications for parts or assemblies that are assigned a find number shall be itemized in the integral or separate PL or in a table on the drawing. Items identified as substitutes may be assigned the same find number as the items for which they may be substituted. The same find number may also be used to identify approved design variations. Find numbers are for cross-referencing purposes only within the drawing and associated lists, and shall not be used for procurement or marked on the items they represent or the assemblies containing the items. Reference designations in accordance with ANSI/IEEE STD 200 and IEEE STD 315 may be used as find numbers. See ASME Y14.34M.

406. Identification requirements. All drawings, associated lists and items shall be assigned identifications as follows:

406.1 New drawings and associated lists. New drawings and associated lists shall be assigned a CAGE Code in accordance with 401 and 406.4; drawing numbers in accordance with 402 and 408.5. Items shall be assigned PINs in accordance with 404, 406.6 and 406.10.

406.2 Existing drawings and associated lists. Existing drawings and associated lists which do not contain a CAGE Code, FSCM or Code Identification shall be assigned a CAGE Code (see 604) in accordance with 401. The CAGE Code shall be placed as near as possible to the title block or associated list number. The CAGE Code shall be preceded by the phrase "CAGE CODE" or "CAGEC".

406.3 Referenced documents. All documents, other than Government or non-Government standardization documents referenced on drawings, shall be assigned a document identification number, and a CAGE Code. Reference documents shall be identified on the drawings in accordance with 406.11. The contractor design activity is responsible for assigning or obtaining document numbers and the CAGE Code for documents used with drawings. Technical orders, pamphlets and recordings are not considered referenced documents, and, therefore, shall not be referenced on engineering drawings without Government design or procuring activity approval.

406.4 CAGE Code. The CAGE Code shall be the CAGE Code of the design activity whose drawing number is assigned to the drawing and shall be entered on the drawing in the appropriate block, as shown in Figure 400-1. CAGE Code assignment shall establish a relationship between the assigned Code and the design activity name and

address (appearing on the drawing), at the time of assignment. (Notice of change in design activity name or address are subject to review by the Government and are forwarded to: Defense Logistics Services Center, Defense Logistics Agency, Battle Creek, Michigan 49016.) See also 406.9.

406.5 Drawing number structure. The drawing number shall not exceed 15 characters. These characters may include numbers, letters, and dashes with the following limitations: (See 406.6).

- a. Letters "I", "O", "Q", "S", "X" and "Z" shall not be used; however, letters "S" and "Z" may be used only if they are a part of the existing drawing numbering system. They shall not be used in the development of new drawing numbering systems.
- b. Letters shall be uppercase (capital letters). Numbers shall be Arabic numerals. Fractions, decimals and roman numerals shall not be used.
- c. Blank spaces are not permitted.
- d. Symbols such as: parentheses (), asterisks *, degree °, plus +, shall not be used, except when referencing the Government or non-Government standardization document whose identification contains such a symbol.
- e. The CAGE Code, drawing format size letter, and drawing revision letter are not considered part of the drawing number.
- f. Drawing numbering systems shall preclude duplication of assigned numbers. Numbering systems may be based on either non-significant numbers or significant numbers.

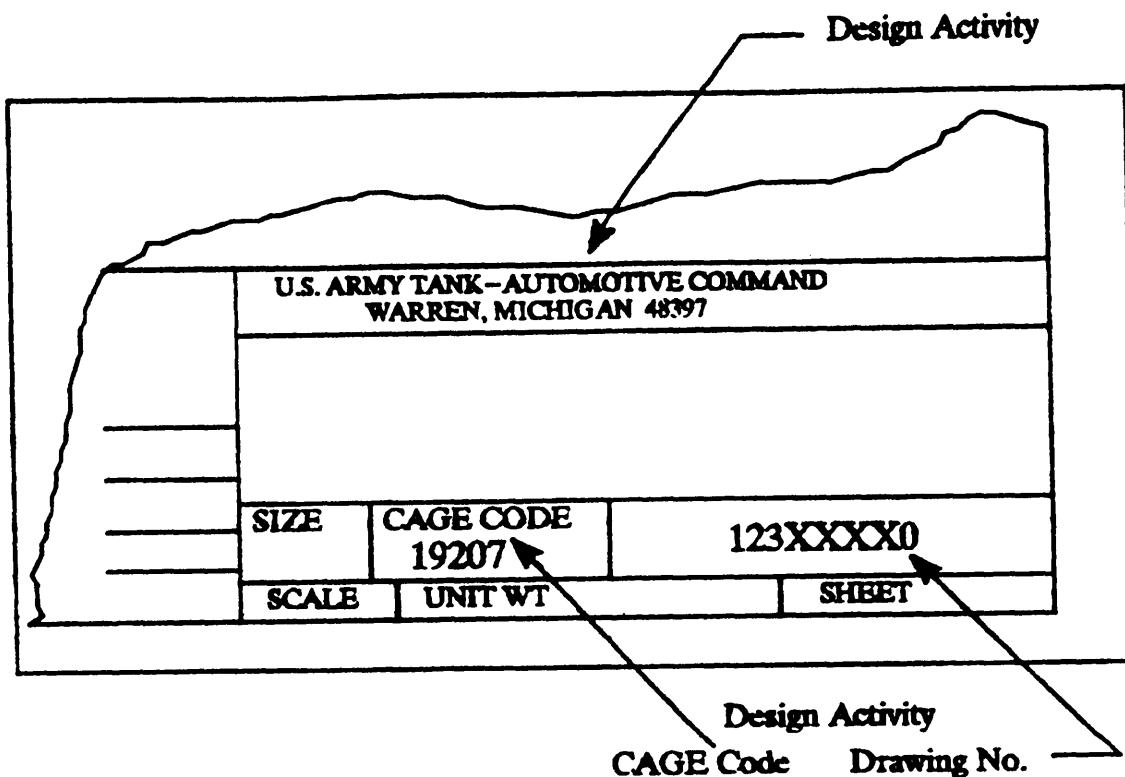


FIGURE 400-1. Example of CAGE Code, drawing no., design activity relationship as originally specified

406.6 PIN length and application. PINs shall not exceed 15 characters. This number shall be or shall include the drawing number indicated on the drawing on which the item is described. Where more than one item is described on a drawing, unique identification shall be provided by the addition of a suffix identifier (formerly called dash number), with the following limitations: (For bulk items see 406.15.4).

- a. The total length of the PIN including the suffix identifier shall not exceed 15 characters.
- b. The suffix identifier shall have the same characteristics as drawing numbers (see 406.5).
- c. Suffix identifiers may be used even if only one item is described on a drawing.
- d. PINs shall not include the drawing revision (see 406.5.e).
- e. Once assigned, PINs shall not be changed except as permitted or required by 406.10 and 406.13. When additional items are added to a drawing, the PINs of existing items shall not be changed, even if no suffix identifier was originally assigned.

NOTE: Contractor-manufacturer part and drawing numbering systems. Contractors and manufacturers are encouraged to forward to the Commander, Defense Logistics Services Center, ATTN: DLSC-FBA, Federal Center, Battle Creek, Michigan 49016, an explanation of their part and drawing numbering systems to be included in Cataloging Handbook H7, Manufacturers Part and Drawing Numbering Systems for Use in the Federal Cataloging System.

406.7 Records. A complete and accurate record of drawing numbers shall be maintained by the design activity allocating or assigning the numbers. Duplicate drawing number assignment within an assigned CAGE Code shall be avoided.

406.8 Associated lists. Associated lists shall be assigned the same identifying numbers as the parent drawing to which it pertains. This identifier shall be prefixed by the letters "PL", "DL", or "IL" as applicable. This prefix becomes an integral part of the list identifier. When no parent drawing exists, associated lists shall be assigned a drawing number with the associated prefix "PL", "DL", or "IL". The fifteen-character PIN limit shall not apply in those instances where the applicable associated list prefix plus the drawing number exceeds fifteen characters.

406.9 Transferring design responsibility to another activity. When the design responsibility for engineering drawings is transferred from one design activity to

another, the drawing number(s) and PIN(s) shall be transferred to the new design activity for administration. The new assignee shall add his CAGE Code, name, and address on the drawing by revision action to identify change in design responsibility. In no case will the original drawing identity be changed or relocated to indicate a new CAGE Code. Figure 400-2 illustrates an example of drawing notations indicating a transfer of design responsibility.

NOTE: In addition, the CAGE Code of the original design activity specified in the item identification marking requirement shall not be changed.

406.9.1 Maintaining design activity identities. When drawings are redrawn, the original design activity CAGE Code and drawing number shall be shown in their applicable locations as on the original documentation. See Figure 400-2.

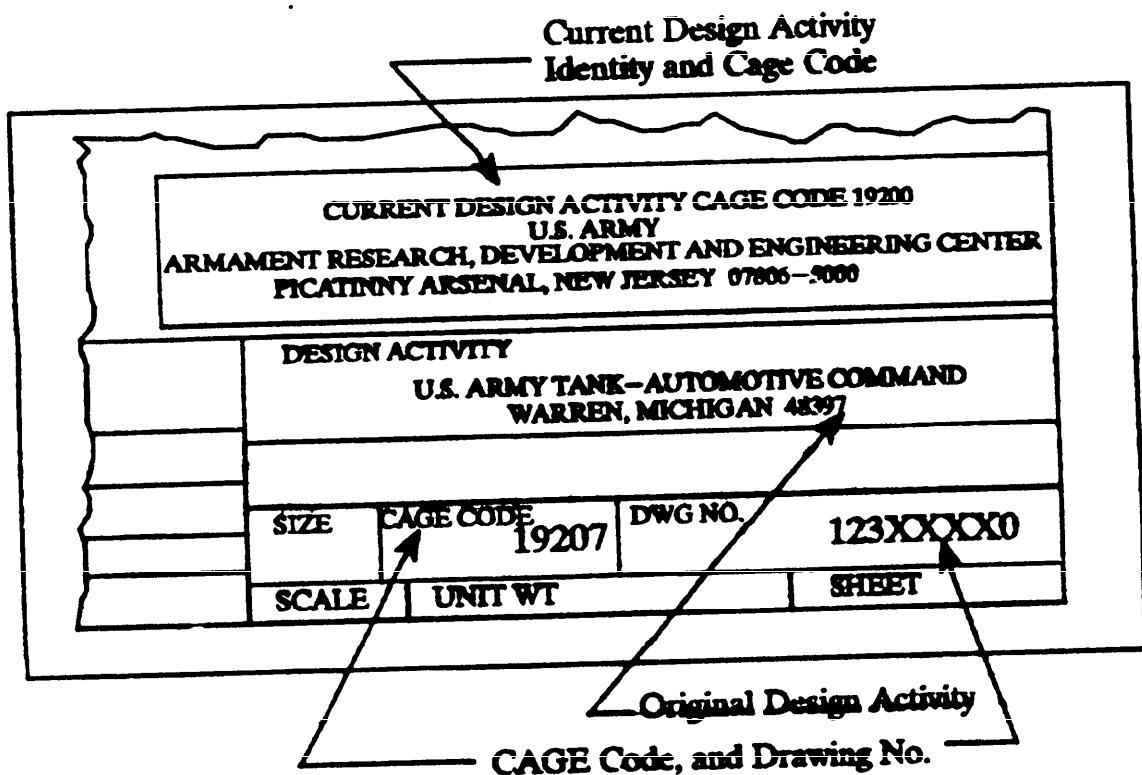


FIGURE 400-2. Example of drawing notation when design responsibility is transferred.

406.10 Item identification and PIN. Each item shall be identified as follows:

- a. Design activity items shall be assigned PINs that meets the requirements of 406.6.
- b. When several items are detailed on a single drawing by tabulation, or through multi-detail, detail assembly, or installation drawing, each item shall be assigned a separate PIN meeting the requirements of 406.6.
- c. Altered and selected items shall be assigned a PIN meeting the requirements of 406.6.
- d. Source control items shall be assigned a PIN meeting the requirements of 406.6. See Note 1.
- e. The PIN for an item delineated on a vendor item control drawing shall be the part number assigned by the vendor. However, reference to the items depicted shall be to an administrative control number established by the vendor item control drawing and, as applicable, suffix identifiers. Administrative control numbers shall have the same requirements as a PIN. See Note 2.
- f. When interchangeable items are repairable, but the repair parts are not interchangeable, each item shall be assigned a separate PIN.

NOTE 1: Source control drawing numbers along with applicable suffixes establish PINs. When more than one vendor is listed on a source control drawing for items that are repairable and the repair parts are not interchangeable between the vendors, each vendor item shall be assigned a suffix identifier of the source control drawing.

NOTE 2: Vendor item control drawing numbers (and applicable associated suffix identifiers) shall not be used as a PIN to physically reidentify the item. Vendor item control drawing numbers are used as a cross reference to vendor part numbers for administrative and documentation control purposes.

406.10.1 Identification cross reference. When items are identified by more than fifteen characters or do not meet the other requirements of 406.5 and 406.6 and a design activity has no control over this assignment, an administrative control number may be assigned to the item in order to meet the identification requirements of 406.5 and 406.6. This includes items controlled by Government and non-Government standardization documents. The administrative control number shall identify the item

for administrative purposes. See also "Identification Cross-reference Drawing", ASME Y14.24M and Chapter 200. Accordingly, the assigned administrative control number may reflect an actual identification cross-reference drawing or a data base entry.

406.11 References to items. References to items shall be made as follows:

- a. Reference to items shall be made by complete PINs (see 406.10), find numbers (see 405), referenced designators, or administrative control numbers.
- b. When an item is referenced on a document having the same number as the item, only the suffix identifier need be shown.
- c. Reference to items covered by a published standardization document shall be made by the PIN established by the standardization document. If the standardization document number is not discernible from the PIN, it shall also be shown. See 406.15.

Example: RNC55H1001FS per MIL-R-55182/1

- d. Reference to altered items or selected items shall be by the design activity assigned PIN.
- e. Reference to source controlled items shall be by the design activity assigned PIN.
- f. Reference to items delineated on vendor item control drawings shall be by the administrative control number.

406.11.1 Vendor item control and source control notations. When an item delineated on a vendor item control or source control drawing is referenced on the next assembly, or other applicable drawing or parts list, the reference (406.11e and 406.11f) shall be accompanied by one of the following applicable notations:

"VENDOR ITEM - SEE VENDOR ITEM CONTROL DRAWING" or
"VENDOR ITEM - SEE SOURCE CONTROL DRAWING".

406.11.2 CAGE Code as a prefix. PINs and referenced documents shall be preceded by the CAGE Code of the original design activity except:

- a. When the part is a standard or specification item, the documentation for which is listed in the Department of Defense Index of Specifications and Standards (DoDISS).

- b. When the referenced document is listed in the DoDISS.
- c. When the CAGE Code for the item identified or document being referenced (detail callout) is common to the code of the document on which it is listed or referenced.
- d. When the CAGE Code is shown in the PL, it may be omitted from the part callout on the face of the drawing.

406.12 Numbering of related parts. Numbers to identify special relationships between parts shall be assigned as follows:

406.12.1 Matched part designation. Matched parts shall be marked with the word "SET" next to the PIN assigned to identify the matched set or pair of parts. See also ASME Y14.24M.

406.12.2 Symmetrically opposite (mirrored) parts. Symmetrically opposite parts, if not described by separate drawings, shall be described using one of the following methods:

- a. Detail each part in a separate view. Each part shall be identified by the suffix identifier system. See 406.6. Do not specify "SHOWN" and "OPPOSITE".
- b. Detail one of the parts in a view and identify each part by the suffix identifier system. See 406.6. For example, include on the drawing under the view the designation "765432-1 SHOWN" and "765432-2 OPPOSITE" or "-1 SHOWN" and "-2 OPPOSITE". The use of odd suffix identifiers for the parts shown and even suffix identifiers for the opposite parts is preferred. This method is useful if the view is clear enough to distinguish the opposite part.

406.12.3 Inseparable assembly. When two or more pieces are permanently fastened together by welding, riveting, brazing, cementing, bonding, or other processes to form an inseparable assembly, the assembly shall be assigned an identifying number. The individual pieces may be assigned PINs as described in 406.10 and called out on the inseparable assembly.

406.13 Change requiring new identification. When a repair part within an item is changed so that it is no longer interchangeable with its previous version, it shall be assigned a new PIN. A new PIN shall also be assigned to the next higher assembly for the changed repair part and to all subsequent higher assemblies up to and including the

level at which interchangeability is re-established. The design or procuring activity shall assign new PINs when a part or item is changed in such a manner that any of the following conditions occur:

Condition 1. Performance or durability is affected to such an extent that superseded items must be discarded or modified for reasons of safety or malfunction. interchangeable.

Condition 2. Parts, subassemblies, or complete articles are changed to such an extent that the superseded and superseding items are not interchangeable.

Condition 3. When superseded parts are limited to use in specific articles or models of articles and the superseding parts are not so limited to use.

Condition 4. When an item has been altered, selected, or is a source control item. (see Chapter 200 and ASME Y14.24M)

406.13.1 Computer program. When an item is changed in such a way that it necessitates a corresponding change to a computer program for operation, self test or maintenance test, the PIN of the item and its next assembly and all progressively higher assemblies shall be changed up to and including the assembly where computer programs are affected.

406.14 Changes not requiring new identification. When a part or assembly is changed in such a manner that conditions of 406.13 do not occur, the PIN shall not be changed. Under no condition shall the PIN be changed only because a new application is found for an existing part. When an item has been furnished to the Government, the applicable PIN shall not be changed unless conditions in 406.13 apply. However, when a design activity desires to create a tabulated listing or a standard because of a multiple application of an item, the aforementioned need not apply. The superseded drawing shall identify the document which superseded it. The superseding document shall identify the PINs replaced and provide a complete cross-reference of superseded PINs to replacement PINs.

406.15 Identification of materials, processes and protective treatment. Materials, processes and protective treatment necessary to meet the design requirements of an item shall be identified on the drawing or PL by reference to the item identification, identification cross reference, or to the applicable specifications or standards, including type, grade, class, or condition as applicable. Revision or amendment symbol of the specification or standard shall not be indicated unless it can be established that a particular revision level or existing amendment has a critical relationship to drawing interpretation or item function. Additional reference to other equivalent specifications is permitted. If necessary these items may be reidentified in accordance with 406.10.1.

406.15.1 Group identification. A set of requirements common to items delineated on different drawings may be consolidated into a single document and referred to by a single document identifier. This document shall be part of the drawing set. A single document prepared to group together several requirements shall not be used to circumvent the requirement to prepare a specification.

406.15.2 Other identification. When parts, materials, processes and protective treatments are used which cannot be identified adequately in accordance with 406.10, a separate drawing or specification (if applicable) shall be prepared. See 406.10.1. The document or PIN shall be specified on applicable drawings.

406.15.3 Formulation identification. Formulation (such as chemical constituents of explosives, propellants, pyrotechnics or fillers) shall be considered and treated as a part and identified in accordance with 406.6 (PINs) or 406.11c (specification or standard based identifications).

406.15.4 Bulk items identification. Bulk items shall be identified by a discrete identifier in accordance with 406.10 or 406.15. Where practicable, the quantity or measurement of material shall be included. Separate engineering drawings shall not be prepared for specific quantities of bulk items, unless the conditions specified in 406.15.4.1 apply.

406.15.4.1 Drawings for bulk items. Any bulk item, requiring assignment of National Stock Number and not having an associated PIN system, shall require a drawing and PIN if no supporting documentation exists (such as a military specification or standard, or non-Government standard). Bulk items, which have a finite shape, such as wire, tubing, cable, chain, tape and hose, and are required for logistics support, shall be identified as a component on assembly or installation drawings through a discrete PIN consisting of a document number and suffix identifiers, as applicable to identify each size, length or quantities used in the assembly or installation. Accordingly, the absence of controlling documentation and PIN system shall require a separate drawing. Separate drawings shall not be prepared for bulk items covered by existing specifications or standards except where there is a support requirement and an absence of a PIN system.

CHAPTER 500

MARKINGS ON ENGINEERING DRAWINGS

500. General. This chapter establishes requirements for application of markings on engineering drawings and associated lists. These markings are used in support of and in addition to graphics and text to convey information about the drawing, the list or items depicted thereon. The intent of this chapter is to standardize marking nomenclature, control graphics of symbology, and indicate minimum requirements for management data that is currently mandatory for drawing and associated list maintenance and application by Government design or procuring activities.

501. Items and processes, special notations. When items or processes require special notations on the drawing, relevant drawings shall identify such items, processes, or both, as applicable, with specific markings, notations, or both. Acronyms, descriptions, and relevant references, are shown in Table I.

501.1 Marking for special items and processes. When it is required to identify special consideration item(s), process(es), or combination of item(s) and process(es), the appropriate symbol(s), such as shown in Figure 500-1, shall be prominently displayed near the title block and shall use the same size letters as the drawing title. The appropriate symbol shall also be placed at the line entry of the applicable item(s) or process(es) in the parts list and shall use the same size lettering as the parts list entries.

501.2 Feature identification. When a specific feature of a drawing is the cause for special item or process status, that feature shall be identified with the appropriate symbol. The symbol shall be placed adjacent to the note or dimension(s) defining the characteristic. For tabulated dimensions or features, the table shall contain an entry for the applicable symbol.

501.3 Symbology.

501.3.1 Established symbology. For those items and processes that have unique symbology established through existing standardization documentation, that symbology shall be marked on drawings and lists in accordance with the requirements of this standard and the applicable supporting standardization documentation. Examples of acronyms associated with such established symbologies are shown in Table I with the supporting document listed in the "REFERENCE" column. Examples of established symbologies are shown in Figure 500-1.

501.3.2 Symbology without established references. Those items and processes for which there is no

existing supporting standardization documentation shall be marked on drawings and lists in accordance with the acronyms and symbology established in this standard. See Table I and Figure 500-1.

501.4 Notes. For drawing notes associated with special items and processes, refer to 101.19.6. If, on an assembly drawing, the special item or process is the assembly method(s) or procedure(s), this shall be reflected in the drawing notes. If the special item or process is itself a note, the symbol shall be placed as follows:

Preferred: 5. HEAT TREAT PER _____

Alternate: 5. HEAT TREAT PER _____ *CSI*

501.5 Exceptions to boxed symbols. For systems which cannot produce the boxed symbols, and for standard text, alternate symbols such as "HCl", "-OCP-", "-CSI-", "ODC", or "INT", in applicable note and text size, may be used. The same symbology structure shall be used throughout the drawing or list. However, for the ESD symbol shown in Figure 500-1, only that symbol shall be used in non-text applications.

501.6 Specialized notes.

501.6.1 Hardness critical note. The following note shall be used for nuclear hardness critical items and processes:

THIS (enter the word DRAWING or PARTS LIST, as appropriate)
DEPICTS HARDNESS CRITICAL ITEMS (HCIs) AND (OR) HARDNESS
CRITICAL PROCESSES (HCPs). ALL CHANGES TO, OR PROPOSED
SUBSTITUTIONS OF THESE HCIs OR HCPs SHALL BE EVALUATED
BY (enter the engineering activity responsible for nuclear survivability.)

501.6.2 Ozone depleting chemicals note. The following note shall be used when the use of ozone depleting chemicals (see 6.5) is delineated on the drawing:

THIS (enter the word DRAWING or PARTS LIST, as appropriate) DEPICTS
CLASS 1 OZONE DEPLETING CHEMICALS (ODCs).

502. Item replacement notations.

502.1 Interchangeable items. When an item is replaced by another existing or new item, which is physically and functionally interchangeable and intended for stocking as a fielded replacement, the notation "PIN 9876... INACTIVE FOR NEW DESIGN, USE

INTERCHANGEABLE PIN 1234...", shall be entered on the drawing in accordance with 502.4 (character size). The addition of the note constitutes a change; therefore, an applicable entry in the revision history block in accordance with Chapter 600 is required.

502.2 Noninterchangeable items. When an item is to be replaced by another existing or new item which provides a design improvement but is not interchangeable, the notation "PIN 9876... INACTIVE FOR NEW DESIGN, USE NONINTERCHANGEABLE PIN 1246...", shall be entered on the drawing in accordance with 502.4 (character size). The addition of the note constitutes a change; therefore, an applicable entry in the revision history block in accordance with Chapter 600 is required.

502.3 Drawings of multiple items. When not all of the items on a drawing are replaced, the notation information cited in 502.1 and 502.2 shall be contained in a drawing flagnote or table for each affected item.

502.4 Superseded drawings. When a drawing is redrawn (new original with the same drawing number), and the superseded drawing is to be retained, the word "SUPERSEDED" shall be added to the old original above the title block. Revision history block entries shall be in accordance with Chapter 600. The "SUPERSEDED" notation shall be in characters the same size as the lettering height of the drawing title.

503. Identifying substitute parts. Drawings and PLS show parts, materials, or methods as substitute to permit establishment of alternate sources of supply, permit production of parts by alternate methods of manufacture or permit fabrication of items with substitute parts or materials. If parts are identified on the field of the drawing by part number callout, substitute parts or assemblies shall be identified, directly or by reference, on assembly or installation drawings, with notations such as (or combinations thereof):

127XXXX1 - PREFERRED;
128XXXX3 - SUBSTITUTE;
128XXXX4 - ALTERNATE

504. Security classification and notation. Security classification and notations shall be in accordance with Appendix B.

505. Rights in data legends on drawings. Proprietary restrictions, such as limited rights and Government purpose license rights, shall be marked on applicable drawing sheets with the appropriate approved legend, as specified by the applicable subpart of the Defense Federal Acquisition Regulation Supplement (DFARS). Care should be taken to assure that the legend is delineated in the field of the drawing, within the margins. On drawings that are reproduced in segments, the legend should appear in each microfilm segment. Drawings in book-form need only delineate the legend on the title sheet.

506. Duplicate original. (The following requirement applies to manually prepared drawings. For CAD drawings refer to 509.) When a drawing is replaced by the "DUPLICATE ORIGINAL" process, that is, field of drawing has not been touched-up or reconstructed, the words "DUPLICATE ORIGINAL" shall be added to the drawing in the lower right hand margin, near the title block, with lettering size the same size as the drawing title. See Figure 500-2. The revision level shall not be raised. If reconstruction or touch-up is required, the drawing shall be considered "REDRAWN WITHOUT CHANGE" (see 607 and 607.1). If additional changes are required, the drawing shall be considered "REDRAWN WITH CHANGE" (see 607 and 607.1).

507. Duplicate production master (stable base artwork). Duplicates of a production master, made from the original stable base artwork or CAD system shall be marked "DUPLICATE PRODUCTION MASTER. DO NOT REVISE" in the revision history block area as shown in Figure 500-3 or above the title block. Marking may be accomplished by addition of a label, lettering applied directly on drawing, or other suitable means.

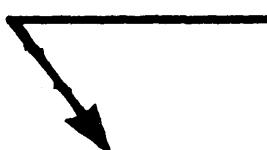
508. CAD reproductions. Reproductions of drawings that are CAD data base controlled shall be marked in accordance with 509 (see also 606). Design activities may add additional information to this note to identify in-house peculiar requirements.

509. Reproductions from digitally maintained data. Copies derived from data that is stored and maintained digitally, shall include a note similar to the following beneath the last entry of the revision history block area (see Figure 500-4), or above the title block.

CAD MAINTAINED. CHANGES SHALL BE
INCORPORATED BY THE DESIGN ACTIVITY.

510. Drawing copies derived from exchanged digital data. When digital data is exchanged between dissimilar digital systems, the exchange format (such as IGES or STEP) shall be included on the drawing copy. This information shall follow the note required by 509. See the following example.

Insert IGES version, example: (3.0)



IGES - ()

TABLE I. Acronyms for special items and processes

ACRONYM	DESCRIPTION	REFERENCE
CSI	Critical Safety Item	MIL-STD-882
CSP	Critical Safety Process	MIL-STD-882
ENI	Environmental Impact	
ESD	Electrostatic discharge Sensitive Devices	MIL-STD-1686/ MIL-HDBK-263
ESS	Environmental Stress Screening	MIL-STD-2164
HAZ	HAZardous conditions, processes, or materials	
HCI	Hardness Critical Item	
HCP	Hardness Critical Process	
I/R	Interchangeability/Repairability	MIL-I-8500
I/IT	INTerface Control	
OCI	Observable Critical Item	
OCP	Observable Critical Process	
ODC	Ozone Depleting Chemical	See 6.5
ODS	Ozone Depleting Substance	See 6.5

CSI CSP ENI ESS

INT I/R HAZ HCI

HCP OCI OCP ODC

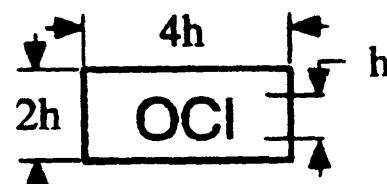
ODS



(ESD SYMBOLS)

HCP

(SYMBOL WITH LEADER LINE)



INDIVIDUAL SYMBOLS

HCI/HCP

CRITICAL SAFETY ITEM



EXTENDED SYMBOLS

FIGURE 500-1. Symbology

2	1			
REVISIONS				
ZONE	REV	DESCRIPTIONS	DATE (YR-MO-DY)	APPROVED
	-			<i>[Signature]</i>
D				
B				
A				
	CONTRACT NUMBER		DESIGN ACTIVITY	
	DRAWN BY	DATE (YR-MO-DY)		
	CHECKED	ENGINEER		
	DRAWING APPROVAL			
	DESIGN APPROVAL		SIZE	CAGE CODE
			SCALE	1 SHEET

FIGURE 500-2. Duplicate original notation.

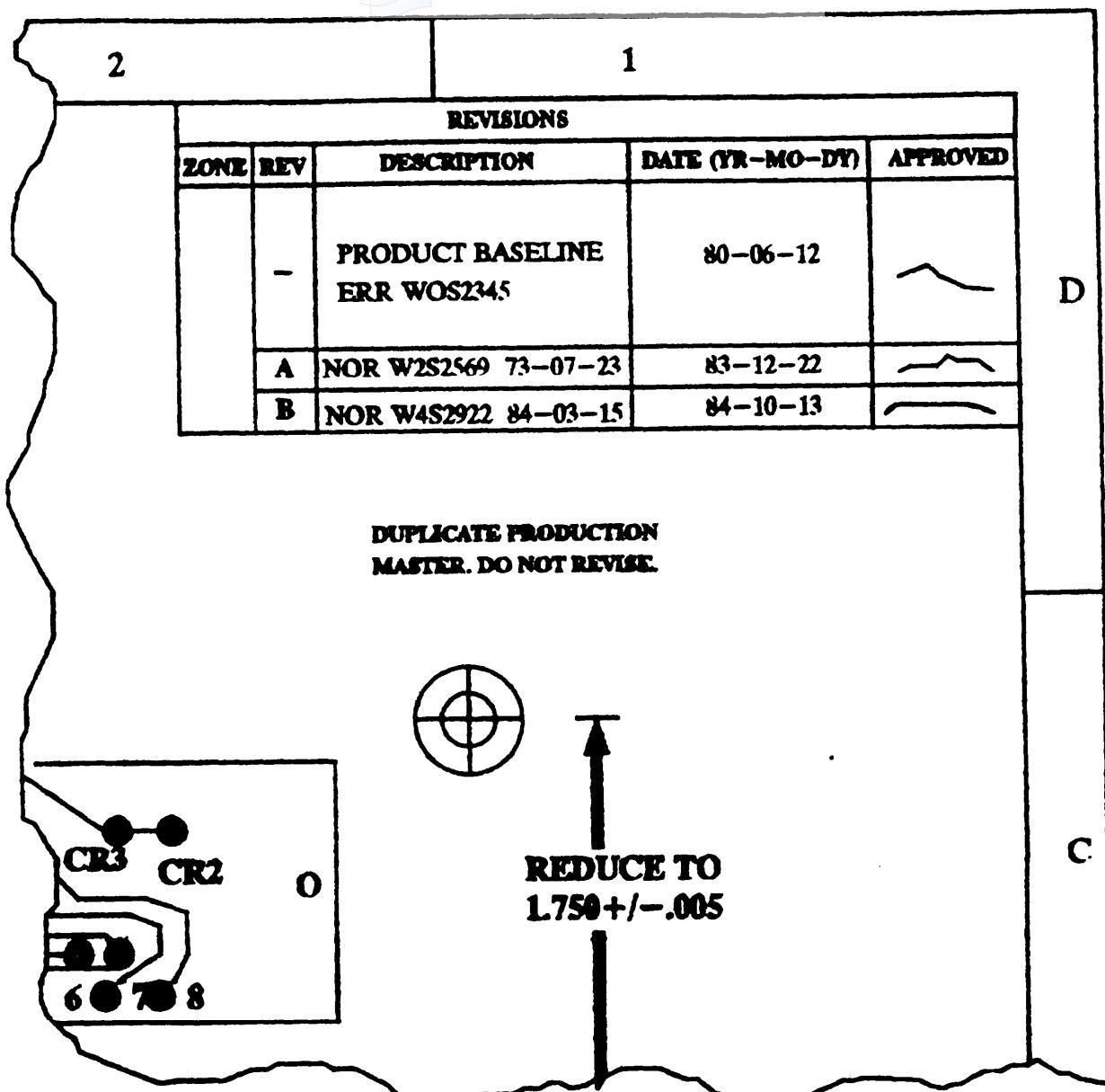


FIGURE 500-3. Duplicate production master drawing notation.

2		1	
REVISIONS			
ZONE	REV	DESCRIPTIONS	DATE (YR-MO-DY)
	A	NOR W052345	80-06-12
APPROVED			
D			

CAD MAINTAINED. CHANGES
SHALL BE INCORPORATED BY
THE DESIGN ACTIVITY

FIGURE 500-4. Location of CAD generated drawing note.

CHAPTER 600

REVISION OF ENGINEERING DRAWINGS

600. General. This chapter covers methods for revising engineering drawings and for identifying and recording revisions on original drawings.

601. Revision methods requirements. The requirements for the revision of drawings shall be in accordance with ASME Y14.35M and the following.

602. Drawing practices. When revising an existing engineering drawing, the graphic symbols, designations, lettering style and size, material (lead/ink) and method of application and drawing practices (such as line width) used in creating the original drawing format shall be followed unless otherwise directed by the design or procuring activity. When a drawing is being revised and does not reference the dimensioning and tolerancing standard or applicable issue, a determination of the applicable standard or issue shall be made, and the proper standard then specified on the drawing and recorded as a change in the revision history block or in the applicable revision authorization document.

603. Revision symbols. Revision symbols shall not be used on drawings in book-form, artwork master or undimensioned drawings and schematic or wiring diagrams where the use of such symbols may conflict with other symbols as used on these kinds of drawings.

604. Required revisions. Any change to a drawing or associated list, except as noted in 604.1 and 607, requires advancing the revision level. When security classification is changed on a drawing, this will constitute a revision to the drawing. However, addition of CAGE Code (see 401) may be accomplished concurrent with needed drawing revision but need not be described in the revision history block or revision authorization documents.

604.1 Changes not requiring revision level advance. Delivery contract numbers may be added to copies of contractor's drawings upon release for delivery to the Government without revision action.

605. Recording revisions on drawings.

605.1 Approval. See also 101.19.

605.2 Revision date. The date structure shown in the revision history block shall be the same as that specified in 101.20.

605.3 Continuing the recording of revisions. Recording of revisions may be on an additional supplementary revision history block or on another sheet when additional room is needed. When the revision history block is continued on another sheet, a reference to its location shall be made. If new sheets are added, see ASME Y14.35M.

605.4 Revision history retention. The latest revision, with the change authorization document identification or revision description, shall be listed on the drawing. However, previous revision history may be omitted.

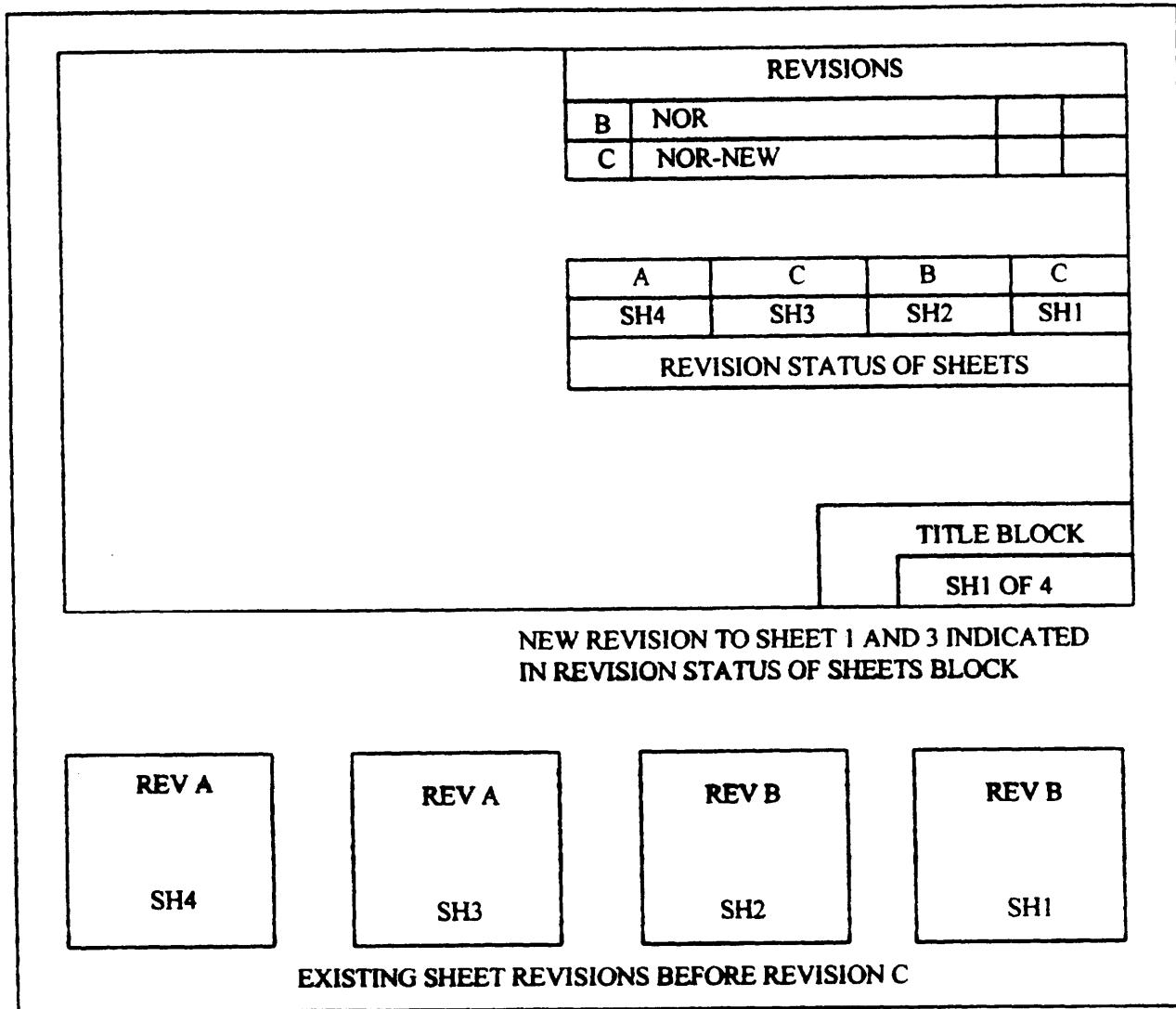
605.4.1 Removal of revision history. Removal of revision history is accomplished through one of the following methods:

- a. Remove one complete revision record entry at a time until enough space is available to record the current revision, starting with the oldest revision recorded and continuing in alphabetical order until sufficient space is available.
- b. Remove all previous revision history.
- c. Remove all previous revision history but retaining a line entry for each revision level that identifies the revision authorization document(s) and date of revision.
- d. Remove all previous revision history except that associated with the revision immediately preceding the current revision.

NOTE: Revision entries addressing rights in data or security classification shall be retained.

605.5 Revision of multi-sheet drawings. See Figure 600-1 for an example of entries in the revision status of sheets block when revising a multi-sheet drawing.

606. Revisions to production master drawings. Revisions to production master drawings (reproduction of the artwork master) shall be made to the original artwork master drawing or CAD file only. New duplicate production masters shall be reproduced from the revised original artwork master or CAD system and shall be marked in accordance with 508.



The above figure is informational only and complete to the degree necessary to illustrate a sample format. Actual format and drawing shall conform to the textual requirements set forth in this standard.

FIGURE 600-1. Revision of a multi-sheet drawing

607. Redrawn drawings. A drawing may be redrawn to replace an original that has been damaged, become unreadable, is too cluttered to incorporate changes, or to convert manually maintained data to digitally maintained data. When a drawing is redrawn without change, the revision level of the drawing need not be advanced. When a drawing is being redrawn with change, the drawing level shall be advanced. Reproductions of digitally maintained data of the same revision level as that currently released, shall not be considered redrawn and shall be marked in accordance with 510.

607.1 Redrawn with or without change. The original date and contract number shall be included on the new drawing. The approval record of the old drawing may be applied to the new original or a new record of approval shall be entered. When the approval record from the old drawing is used, the original names and signatures may be printed. Previous revision symbols, cross-outs, and revision history may be omitted from the new drawing. Applicable notations such as shown in Figure 600-2 are entered in the revision history block. For drawings redrawn with change, changes shall be described in accordance with ASME Y14.35M and as directed by the design or procuring activity.

608. Drawing supersession. Drawing supersession shall be in accordance with ASME Y14.35M and the following.

608.1. Superseded (old) drawing, same number. Notation such as shown in FIGURE 600-2 are entered in the revision history block of the superseded drawing. The word "SUPERSEDED" shall be added just above the title block. See 502.4

REVISIONS					
ZONE	REV	DESCRIPTION	DATE(YR-MO-DY)	APPROVED	
		<p><i>Do NOT enter revision letter or date or signature</i></p> <p>REPLACED WITH CHANGE BY REV</p> <p><i>Enter next sequential revision letter or if applicable, enter notation</i></p> <p>REPLACED WITHOUT CHANGE BY REV</p> <p><i>Enter next sequential revision letter (if applicable)</i></p>		<p><i>Enter notation</i></p>	

FIGURE 600-2. Superseded (old) drawing notations redrawn with same number

CHAPTER 700

ASSOCIATED LISTS

700. General. This chapter establishes minimum requirements for the preparation of Parts Lists, Data Lists and Index Lists.

701. Parts list (PL). A PL is a tabulation of all parts and bulk materials (except those materials which support a process, see NOTE) required to manufacture the item to which the list applies. Reference documents may also be tabulated on a PL. Items listed on a subordinate assembly PL or specified in a referenced document need not be repeated in the using assembly PL unless it is necessary to limit options permitted by the subordinate document.

NOTE: Materials that support a process are those that are not retained on an item. They are used for performing a specific process (such as cleaning solvents or masking materials) and are not considered a part of the end item. Process materials such as marking inks or solder, that are retained on an item are identified in the PL for that item.

702. Data list (DL). A DL is a tabulation of all engineering drawings, associated lists, specifications, standards, QAPs, and all other documents (contained within the drawing set) pertaining to the item for which the data list is prepared.

703. Index list (IL). An IL is a tabulation of DLs and subordinate ILs pertaining to the item to which the IL applies.

704. General requirements (associated lists).

704.1 List preparation. Lists may be prepared manually or from digital data. The type(s) of list(s) to be prepared, drawing assembly level at which lists will be prepared, and whether PLs shall be prepared integral to or separate from the drawing shall be as contractually specified. Lists prepared integral to the drawing shall be of the form and location indicated in ASME Y14.34M. Entries shall follow rules established for appropriate columns as provided in this chapter and in ASME Y14.34M. Identification of associated lists shall be in accordance with 406.8.

704.1.1 Lists prepared from digital data. Lists prepared from digital data shall follow preparation requirements as provided herein. However, preprinted formats need not be utilized if machine operations can duplicate format headings and listing. See FIGURE 700-1. Sheet size of lists derived from digital data shall be commensurate with machine capability. See FIGURE 700-2 for example of PL prepared from digital data.

704.1.1.1 Revision of digital data prepared lists. The revision letter shall be shown for each sheet and may be the same for all sheets.

NOTE: Digital data bases retained by the contractor design activity for subsequent list preparation as electronic generated data (EGD) may be accepted in lieu of machine or manually prepared lists at the option of the cognizant procuring activity. Instructions for the preparation of these kinds of submissions will be provided by the procuring activity.

704.1.2 Revision of manually prepared lists. Each sheet of a list shall show the revision level applicable to that sheet. Integral PL sheets shall record revision status in accordance with the system applicable to their parent drawing. When a separate PL, DL, or IL is to be revised and reissued in its entirety, all sheets may show the same revision level, including those that have not been revised. Lists may be revised independently of the associated drawings; however, related changes shall be incorporated concurrently.

704.2 Multiple sheets. When more than a single sheet is required to prepare or revise a list, the list title may be shown on each sheet; however, it is required on the first sheet only.

704.2.1 Sheet numbering. All sheets shall be numbered consecutively starting with number one (1). The total number of sheets shall be the actual sheet count. When sheets have been added or deleted by revision action, the total number of sheets may differ from the number assigned to the last sheet. Sheets 2, 3, and so on, need indicate only sheet number in this block.

704.3 Reproducibility requirements. See 101.2.

704.4 Revision identification. A revision letter and the date of revision shall be applied to each list or each affected sheet of a list when any change is made. The letters "I", "O", "Q", "S", "X" and "Z" shall not be used as revision letters.

704.5 Deleting items. Items to be deleted shall retain the same find number. The nomenclature shall be erased and the word "DELETED" inserted in the nomenclature or description column. When using digital data techniques, items deleted shall be omitted on the next list run or the word "DELETED" may be inserted in the nomenclature or description column.

704.6 Adding items. New or superseding items may be either added chronologically at the end of a list or inserted in the list in the proper sequence. Additional sheets may be added when the last sheet will not accommodate additions.

704.7 Revision description. A description of every change, addition or deletion processed shall be recorded by revision description either on a sheet of the affected list (cover sheet or subsequent change sheet) or on a separate change authorization document or revision notice that is referenced on the list. See also 708.

704.8 Design activity identification. The current design activity's name shall be entered on all associated lists in the block provided.

704.9 Block and column size and arrangement. The size and arrangement of all blocks and columns is determined by the preparer according to the method of preparation used. However, size and arrangement is subject to approval of the design or procuring activity.

704.10 Additional blocks and columns. Additional blocks and columns may be added for use of the preparer. However, addition of blocks and columns is subject to the approval of the design or procuring activity.

704.11 Authentication, parts, data, and index lists. See 101.19.

705. PL preparation.

705.1 PL format. PLs shall be prepared in the format specified by the design or contracting activity. Sample format and PL derived from digital data are illustrated in Figures 700-1 and -2. A sample manually prepared PL is illustrated in Figure 700-3. However, block and column entries indicated below and in ASME Y14.34M are specified as "mandatory" or "optional". Blocks and columns that are specified as "optional" may be omitted if they are not used.

705.2 PL requirement. When PLs are required, a PL shall be prepared for each assembly regardless of what level the assembly is used within the equipment or system.

705.3 Separate PLs.

705.3.1 PL identification. Whenever separate PLs are used, a note, "SEE SEPARATE PARTS LIST" shall be located above the title block of the parent engineering drawing. See 101.1.3 and 101.18.5.

705.3.2 Manual preparation. Separate lists prepared manually shall be A or B size in accordance with ASME Y14.1, or A4 or A3 size in accordance with ASME Y14.1M, and follow format design and preparation requirements as provided herein. See 705.1.

705.4 PL entries. PL block and column entries shall be in accordance with ASME Y14.34M and as follows. (See Figure 700-3)

705.4.1 Substitute parts or bulk items. The find number column on the PL and the quantity required column can be used to indicate substitute parts or bulk items. The preferred item is indicated by entering the applicable find number in the find number column and the actual quantity required, if known, will be shown in the "Quantity Required" column. If quantity required is not known, see 705.4.2. The substitute item may be indicated by entering the same find number as the preferred item in the find number column and the notations "SUB" or "ALT" for substitute part will be shown in the Quantity Required column. See the following example:

Find No.	Qty Req.	PIN	Nomenclature or Description	Document No.
15	8	MS9321-16	WASHER, FLAT - AMS 6350	MS9321
15	SUB	MS9320-16	WASHER, FLAT - AMS 5510	MS9320

705.4.2 Column 10, quantity required (mandatory). Enter the quantity for each item required to produce a single assembly to which the list pertains. The abbreviation AR (As Required) or the quantity required, if known, (including the unit of measure when no optional unit of measure column is used) shall be used for bulk items. If nonstandard symbols or abbreviations are used, they will be explained in the parts list or in a referenced document.

705.4.3 Column 11, CAGE Code (mandatory). Enter the appropriate CAGE Code assigned to the design activity whose PIN appears in column 12 or whose document number appears in the drawing document number column (See 705.4.5). When the CAGE Code for an item or document is identical to that entered for the list (block 2), it is not necessary to repeat the code in column 11. Whenever Government or Industry standards or specifications are the basis for entries in the list, a CAGE Code need not be listed.

705.4.4 Column 12, part or identifying number (PIN) (mandatory).

- Enter the PIN including the suffix identifier (when applicable) for parts and bulk items.
- The PIN will be repeated for each suffix identified item. When several items from the same tabulated drawing are used, the drawing is required for the

first and last entries. A line, arrow or ditto marks may be used between the identical portion of the first and last entries. For items delineated on the drawing to which the list applies, only the suffix identifier associated with the item need be entered.

- c. Enter MS or AN number and suffix identifier in this column for parts so identified
- d. When an item is controlled by a military specification and is individually identified by a PIN (such as RNC55H1001FS, 20101BAC), make this entry accordingly.
- e. When type, grade, class or condition are required for identification, such information shall be entered. If this information exceeds the identification limit of 15 characters, it may be entered in the Nomenclature or Description column, or the item may be reidentified. See 406.10.1.
- f. This column may also be used to list referenced documents.

705.4.5 Column 14, drawing or (procurement) document number column (mandatory). The following applies:

- a. The document number applicable to the material from which a listed part delineated on the corresponding drawing is fabricated.
- b. The document number applicable to a listed item for which a designation as to type, class condition, or grade has been entered in the PIN column.
- c. The drawing number applicable to a listed item in the PIN column.
- d. This column may also be used to list referenced documents.
- e. The size column may be included to indicate the document size.

705.4.6 Supplemental list column (optional). A supplemental list column may be included in which "X" entries are made to indicate each item (assembly) that has its own associated list.

706 DL preparation.

706.1 DL format. DLs shall be prepared in a format specified by the design or procuring activity, and in accordance with 706.3. An example of a manually prepared

DL is in Figure 700-4. An example of a DL prepared from digital data is shown in Figure 700-5. Drawings, documents and associated lists pertaining to the item for which the DL is prepared shall be listed thereon.

706.2 DL organization.

706.2.1 Sequence of documents. Drawings and other documents to be listed shall be segregated into groups as follows:

Drawings

Lists - PLs, DLs, special lists (usage, inspection equipment, etc.)

Specifications

Standards

Publications

Other documents referenced on drawings and PL

Documents within the above identified groups shall be further organized by CAGE Code and then alpha-numerically (if applicable). Government and non-Government specifications and standards are listed without CAGE Code. (See 402).

706.3 DL entries. Block and columnar entries on DLs shall be in accordance with ASME Y14.34M.

707 IL preparation.

707.1 IL format. The IL shall be prepared in the format specified by the design or procuring activity, and in accordance with 707.3. An example of a manually prepared IL is Figure 700-6. Blocks or columns classified as optional in ASME Y14.34M may be omitted.

707.2 Sequence. Items shall be grouped under the following headings as applicable:

a. Data lists

b. Index lists

Under each heading, arrangement shall be as follows (refer to Figure 700-6): The list numbers of those items that have the same CAGE Code as the IL shall be arranged alpha-numerically in column 10; their CAGE Code need not be repeated in column 9. The CAGE Code of all other documents shall then be arranged numerically in column 9 with each corresponding list number juxtaposed in column 10. List numbers of those documents having identical CAGE Codes shall be arranged alpha-numerically in column 10. This sequence need not be maintained after list revision.

707.3 IL entries. Block and columnar entries on ILs shall be in accordance with ASME Y14.34M and as described herein.

708 Revision history block on lists. In lieu of "Revision, LTR, DATE" and "REV AUTH NO" blocks, PLs, DLs, and ILs may include a revision history block at the bottom of the applicable list per FIGURE 700-4. Entries for revision letter, description, date and approval would be made in accordance with Chapter 600 of this standard.

CURRENT CAGE CODE		ORIGINAL CAGE CODE		CONTRACT NO.		REV. DATE REVISION LETTER SHEET
PARTS LIST DOCUMENT/PART NUMBER		AUTHENTICATION		ORIG. DATE		
REVISION AUTHORIZATION NUMBER						
FIND NO.	QTY REQ	CAGE CODE	PART OR IDENTIFYING NO	DRAWING/DOCUMENT SIZE NUMBER	NOMENCLATURE OR DOCUMENT TITLE	SUPPL LIST

FIGURE 700-1, PL format generated from digital data

<p style="text-align: center;">U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER PICATINNY ARSENAL, NEW JERSEY 07606-3000</p>																																																				
					REV. DATE 700131 REV P SHEET 1																																															
PARTS LIST		PL 10513099	CAGE/IC 9296		CONTRACT NO.																																															
DOCUMENT/PART NUMBER		P 10513099																																																		
BODY ASSEMBLY																																																				
REVISION AUTHORIZATION NUMBER		ARM2021		AUTHENTICATION		ORIG. DATE 640208																																														
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3				7649182	A	7649182	PLUG	X																																												
TOTAL NUMBER OF SHEETS 3																																																				

FIGURE 700-2. PL generated from digital data

PARTS LIST		1. DESIGN ACTIVITY		1A. CONTRACT NO.		2. CAGE CODE CURRENT ORIGINAL		3. ORIG DATE (YR-MO-DY)		4. PL	
5. LIST TITLE				6. AUTHENTICATION				7. SHEET OF SHEETS			
								8. DWG NO.			
9. FIND NO.	10. QTY REQD	11. CAGE CODE	12. PART OR IDENTIFYING NO.	DRAWING/DOCUMENT		15. NOMENCLATURE OR DESCRIPTION				16. SUPPL LIST	17. NOTES
				13. SIZE	14. NUMBER						
18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APP'D	18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APP'D	18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APP'D

FIGURE 700-3. Manually prepared PL

DATA LIST		1. DESIGN ACTIVITY		1A. CONTRACT NO.		2. CAGE CODE CURRENT ORIGINAL		3. ORIG DATE (YR-MO-DY)		4. DL	
5. LIST TITLE						6. AUTHENTICATION		7. SHEET OF SHEETS			
								8. DWG NO.			
9. CAGE CODE	10. PRE- FIX CODE	DRAWING/DOCUMENT		13. NO. OF SHTS.	14. REVISION OR ISSUE STATUS	15. NOMENCLATURE OR DESCRIPTION				16. NOTES	
		11. SIZE	12. NUMBER								
17. LTR	DESCRIPTION	DATE (YR-MO-DY)	APPD	17. LTR	DESCRIPTION	DATE (YR-MO-DY)	APPD	17. LTR	DESCRIPTION	DATE (YR-MO-DY)	APPD

FIGURE 700-4. Manually prepared DL

DATA LIST DL 8267742
DRAWINGS/PART NUMBER 8267742
SEGMENT ASSEMBLY
REVISION AUTHORIZATION NUMBER AUTHENTICATION CAGE CODE 19200
REV. DATE
REVISION LETTER
SHEET 4
ORIG. DATE 741203

CAGE CODE	PREFIX CODE	DRAWING SIZE	DOCUMENT NUMBER	NUMBER OF SHEETS	NOMENCLATURE OR DESCRIPTION	NOTES
96806	PS	A	7506685 PS7506685	1 1	NUT, ROUND PKG DATA SHEET - NUT, ROUND	
		A	7506688 PS7506688	1	RETAINER PKG DATA SHEET, NUT, ROUND	
	PL	C	8267742 PL8267742	1 1	SEGMENT ASSEMBLY PARTS LIST - SEGMENT ASSEMBLY	
			MSS1960	1	SCREW, MACH, PL, CTSK HD, 82DEG, CR RBC, CR35 ST, UNF-2A	

FIGURE 700-5. DL generated from digital data.

INDEX LIST	1. DESIGN ACTIVITY IDENTIFICATION		1A. CONTRACT NO	2. CAGE CODE	3. IL	4. REVISION LTR DATE
5. LIST TITLE			6. AUTHENTICATION		7. REV AUTH NO	8. SHEET OF SHEETS
9. CAGE CODE	10. LIST NUMBER	11. REV LETTER	12. TITLE			

FIGURE 700-6. Manually prepared IL

APPENDIX A

SIGNING AND INITIALING DRAWINGS

10. GENERAL.

10.1 Scope. This Appendix is intended to provide guidance, supplementary to Chapter 100, concerning the signing and initialing of drawings. This Appendix is not a mandatory part of this standard. The information contained herein is intended for guidance only.

20. APPLICABLE DOCUMENTS. This Section is not applicable to this Appendix.

30. DEFINITIONS. This Section is not applicable to this Appendix.

40. GENERAL REQUIREMENTS.

40.1 Manually prepared drawings. Signature and initials entries on drawings and lists are used to assure that responsible individuals have reviewed the document and its content and attest to the conformance thereof to applicable requirements and contract provisions.

40.2 Computer generated drawings. Electronic approval is permissible provided the requirements of 101.19 are met.

40.3 Initial and signature blocks. Figure A-1 illustrates a sample signature block organization and configuration. Actual signature and initial block positions and designation of individuals having signature or initials authority are in accordance with the verification and approval requirements of the design or procuring activity.

CONTRACT NUMBER	
CONTRACTOR	
DRAWN BY	DATE (YR-MO-DY)
CHECKER	ENGINEER
DRAWING APPROVAL	
DESIGN APPROVAL	

FIGURE A-1. Initial and signature block.

APPENDIX A

40.3.1 Signatures and initials authority. Typical review and approval responsibilities and corresponding signature block entries are as follows:

- a. DRAWN BY - The initials of the person who prepared the original drawing.
- b. CHECKER - The initials of the person who checked the original drawing for completeness, accuracy and precision.
- c. ENGINEER - The signature of the engineer responsible for the design of the item depicted.
- d. DRAWING APPROVAL - The signature of the authorized design activity representative responsible for drawing format and completeness. Date entry is optional.
- e. DESIGN APPROVAL - The signature of the authorized design activity representative responsible for design technical adequacy and conformance to end item requirements. Date entry is optional.

40.3.2 Approval of computer generated drawings. Choice of data base maintenance will determine the media on which signatures and initials APPENDIX A entries are to be made. For computer maintained data, an electronic authorization and approval system is preferred.

40.3.2.1 Aperture card signature and revision history block. Figure A-2 illustrates an example of original signature and revision history block entries to be made on the back of a master silver microfilm aperture card, reflecting computer maintained data base without an electronic authorization and approval system. Subsequent generations may indicate printed initials and names of those who signed the first generation aperture card.

40.4 Associated lists. The guidance indicated herein also applies to associated lists.

APPENDIX A

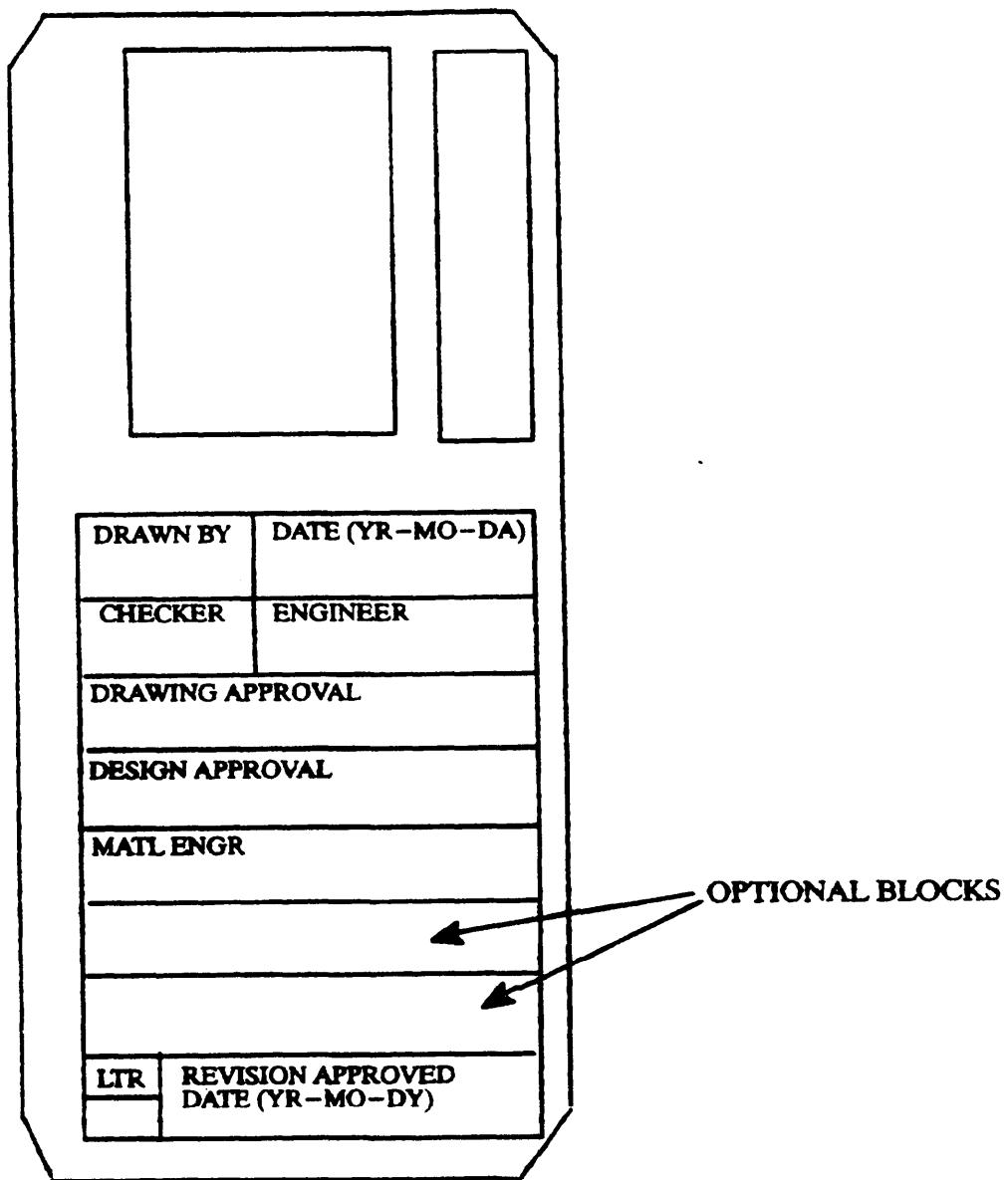


FIGURE A-2. Aperture card signature and revision history block.

APPENDIX B

SECURITY CLASSIFICATION MARKINGS AND NOTATIONS

10. GENERAL.

10.1 Scope. This Appendix is intended to provide direction concerning the marking of security classifications and related notations on drawings. This Appendix is a mandatory part of this standard. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS.

20.1 Government documents.

20.1.1 Other Government documents. The following other Government documents form a part of this Appendix to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DOD 5220.22-M - DoD Industrial Security Manual for Safeguarding Classified Information

(Copies of DoD 5220.22-M are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402-0001)

30. DEFINITIONS. This Section is not applicable to this Appendix.

40. GENERAL REQUIREMENTS.

40.1 Security classifications and notations. Location of espionage, special security and regrading notes such as the sample classifications in Figure B-1, shall be in accordance with DoD 5220.22-M, and Command Security and Local Security requirements, and the direction contained herein.

40.1.1 Assigning classification. Security classification on drawings and associated lists shall be consistent with project or program classification. Classification of associated lists shall be based on the content of the lists and not on the classification of the drawing.

40.1.2 Application of security classification. Security classification markings may be generated from digital data, applied by decals, rubber stamps or by lettering template. Markings shall meet the reproduction requirements of the drawing or list.

APENDIX B

40.1.3 Size of security markings. Security markings shall be larger than any other marking or lettering size on the drawing or associated list.

40.1.4 Color of security markings. All security classifications and notations shall be black.

NATIONAL SECURITY INFORMATION UNAUTHORIZED DISCLOSURE SUBJECT TO CRIMINAL SANCTIONS	DNOWNGRADE TO SECRET ON _____
THIS DOCUMENT CONTAINS HIGHLY SENSITIVE INFORMATION WHICH WOULD BE OF SIGNIFICANT INTELLIGENCE VALUE TO A POTENTIAL ENEMY. ACCESS WILL BE SEVERLY LIMITED TO THOSE INDIVIDUALS WHO MUST KNOW DESIGN DATA AND PRODUCTION TECHNIQUES OF IMPROVED CONVENTIONAL MUNITIONS IN ORDER TO EXECUTE OFFICIAL DUTIES.	CONFIDENTIAL ON _____ DECLASSIFY ON _____ CLASSIFIED BY _____
SECRET CONFIDENTIAL RESTRICTED DATA	CLASSIFIED BY _____ EXEMPT FROM GDS OF EO 11652 EXEMPTION CATEGORY _____ DECLASSIFY ON _____
CLASSIFIED BY _____ SUBJECT TO GDS OF EO 11652 AUTOMATICALLY DOWNGRADED AT TWO YEAR INTERVALS DECLASSIFIED ON DECEMBER 31, _____	

FIGURE B-1. Sample security classification markings.

APPENDIX B

40.1.5 Location of security markings on drawings. Security notations, such as espionage, special security and downgrading notes, shall be placed above the title block on classified drawings. Security classification shall be located within the body of the drawing (other than roll size) above and below the microfilm arrows. See Figure B-2. For sample location on roll size drawings, see Figure B-3.

40.1.5.1 Security markings on roll size drawings. On roll size drawings security markings shall appear on both the face and the reverse of the drawing. The markings on the face of the drawing shall be shown in each drawing segment. The markings on the reverse of the drawing shall be shown on the corners. See Figure B-3.

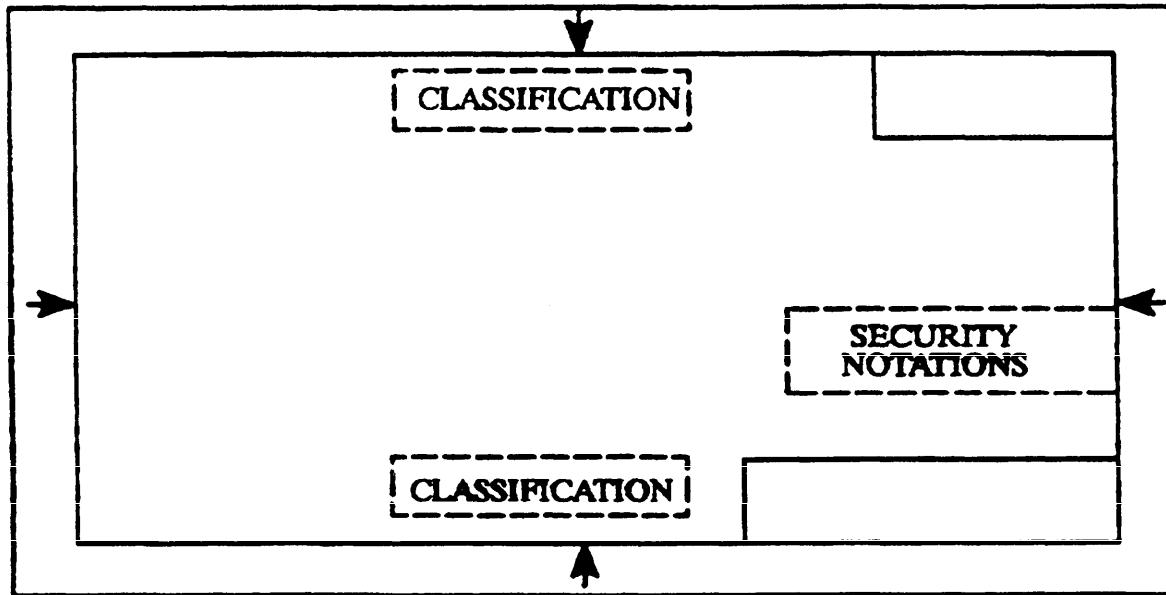


FIGURE B-2. Location of security markings on drawings.

APPENDIX B

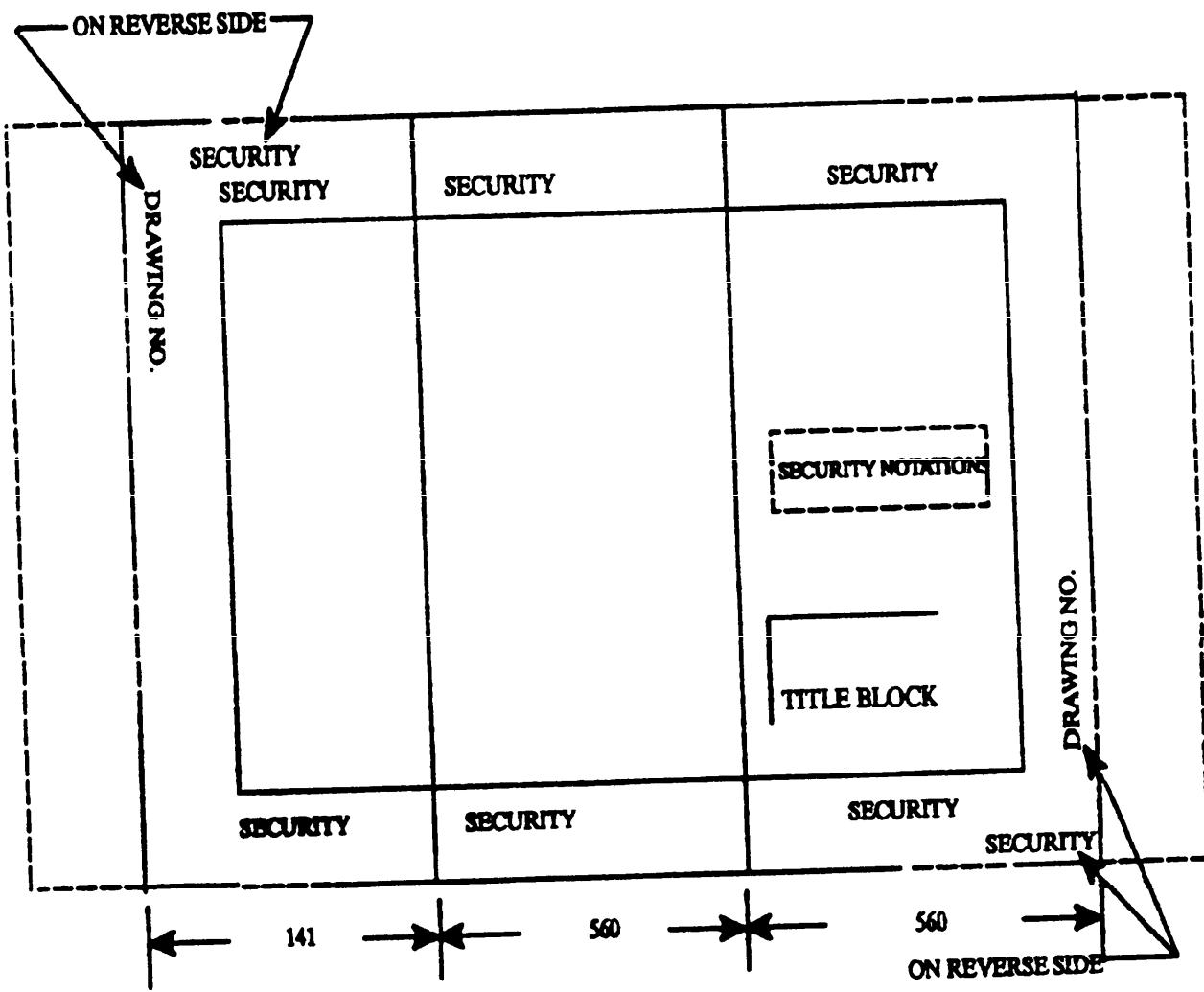


FIGURE B-3. Location of security markings on roll size drawings.

APPENDIX B

40.1.6 Location of security markings on associated lists. Security classification shall be indicated at top and bottom of lists as illustrated in Figures B-4 and B-5.

CLASSIFICATION											
PARTS LIST		1. DESIGN ACTIVITY				2. CAGE CODE CURRENT ORIGINAL		3. ORIG DATE (YR-MO-DY)		4. PL	
5. LIST TITLE				6. AUTHENTICATION				7. SHEET OF SHEETS 8. DWG NO.			
9. FIND NO.	10. QTY READ	11. CAGE CODE	12. BAJET OR IDENTIFYING NO.	DRAWING/DOCUMENT		15. NOMENCLATURE OR DESCRIPTION		16. SUPPL. LIST	17. NOTES		
				13. SIZE	14. NUMBER						
								SECURITY NOTATIONS			
18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APFD	18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APFD	18. LTR	DESCRIPTION	DATE (YR-MO-DY)	APFD
CLASSIFICATION											

FIGURE B-4. Location of security markings on associated lists.

APPENDIX B

CLASSIFICATION

U.S. ARMY
ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ 07806-5000
CURRENT CAGE CODE 19200 - ORIGINAL CAGE CODE 19207

PARTS LIST PL-10513599
DOCUMENT/PART LIST P 10513599
BODY ASSEMBLY
REVISION AUTHORIZATION NUMBER ASH2521 AUTHENTICATION

REV. DATE 730131
REVISION LETTER P
SHEET 1
ORIG. DATE 640630

PART NO.	QTY	UNIT	CAGE CODE	PART OR IDENTIFYING NO.	DRAWING/DOCUMENT SIZE	NOMENCLATURE OR DOCUMENT TITLE	SUPPL. LIST
1				7649178	B 7649178	PLUG	
1				7688718	B 7688718	WASHER	
2				7649178	A 7649178	WASHER	
				7688718	C 7688718	LENS, OBJECTIVE	

SECURITY

NOTATIONS

CLASSIFICATION

FIGURE B-5. Location of security markings on digital data generated associated lists.

APPENDIX B

40.1.7 Location of security markings on drawings in book-form. Security markings shall be placed on pages containing classified information. Security notes shall be placed above the title block. Security classification shall be placed at top of pages. Place the following note on the title sheet. "TITLE SHEET IS UNCLASSIFIED WHEN SEPARATED FROM SHEETS (List all Classified Sheet No.)." See Figure B-6.

CLASSIFICATION		REVISIONS			
APPLICATION	USED ON	CTR	DESCRIPTION	DATE	APPROV'D
CLASSIFICATION TITLE SHEET IS UNCLASSIFIED WHEN SEPARATED FROM SHEETS (List Sheet No. of Classified Sheets)					
REV	REV	REV	REV	REV	REV
REV	REV	REV	REV	REV	REV
REV	REV	REV	REV	REV	REV
CLASSIFICATION SECURITY NOTATIONS					
TITLE	SIZE	CAGE CODE			
			REV	REV	REV

FIGURE B-6. Location of security markings on drawings in book-form.

APPENDIX B

40.1.8 Regrading classification. Documents shall be regraded by either lining out or removing classification and related notes. The current classification, except unclassified, shall be placed adjacent to the previous classification. The reclassification action constitutes a change; therefore, an applicable entry in the revision history block in accordance with Chapter 600 is required. See Figure B-7 (Note: The indication of "OLD" and "NEW" shall not appear on the drawing).

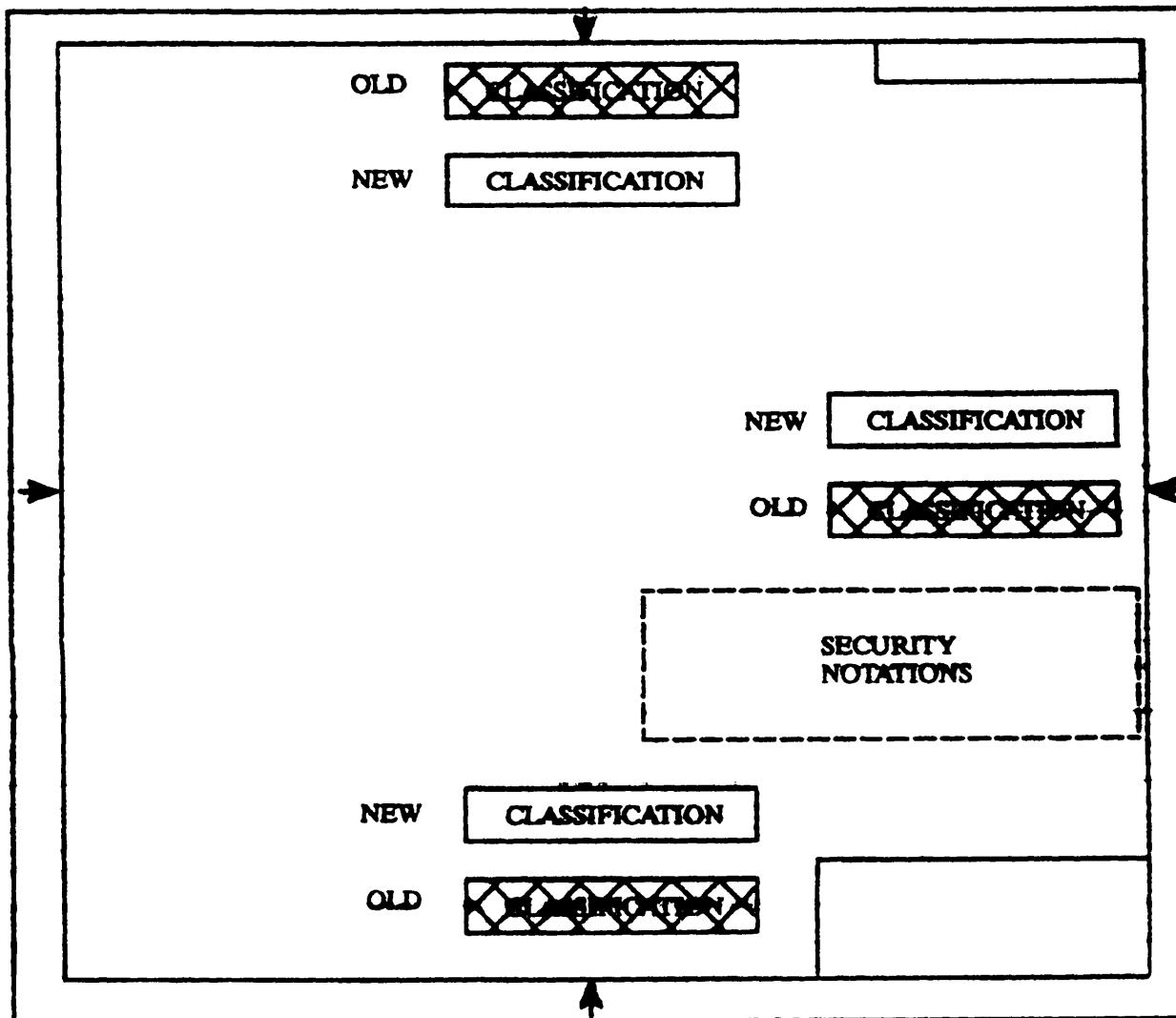


FIGURE B-7. Regrading classification location.

APPENDIX C

QUALITY ASSURANCE PROVISIONS

10. GENERAL

10.1 Scope. This Appendix is intended to provide direction concerning quality assurance provisions (QAPs) that are integral to drawings or uniquely associated with drawings as a distinct, contractually deliverable data element. This Appendix does not pertain to QAPs included in standardization documents such as Military specifications and standards, and non-Government standards. Unless otherwise specified on the contract or purchase order, this Appendix is a mandatory part of this standard. The information contained herein is intended for compliance

10.2 Application. The requirements of this Appendix are applicable to all end-product drawings.

20. APPLICABLE DOCUMENTS.

20.1 Government documents. The following documents form a part of this Appendix to the extent specified:

MILITARY STANDARDS

DoD-STD-2101 Classification of Characteristics

(Copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. For specific acquisition functions, these documents should be obtained from the contracting activity or as directed by the contracting activity.)

30. DEFINITIONS. This Section is not applicable to this Appendix.

40. GENERAL REQUIREMENTS.

40.1 QAPs, general. QAPs shall include all inspections, directly or by reference, to be performed in order to determine that the item to be offered for acceptance conforms to the requirements stated on the drawing. QAPs specify characteristics to be inspected, how the inspection is to be conducted, and the criteria to be used for determining acceptability of the product.

40.2 Responsibility for inspection. The Government's concept of quality assurance is predicated on the fact that responsibility rests with contractors for controlling product

quality and for offering to the Government for acceptance only those items or lots of items that conform to all of the drawing requirements. Accordingly, the contractor's responsibility shall be clearly stated by inclusion of the following in all documents containing QAPs:

"Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth herein where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements."

40.3 Contractual and administrative requirements. A QAP shall not include contractual requirements that are properly a part of the contract, such as cost, quantities to be delivered, time or place of delivery, methods of payment, liquidated damages, rework, repair, resubmittal, requirements for preparation submission, delivery, approval, and distribution of data, record keeping, and actions to be taken by the Government for accepting nonconforming material. Contractual, administrative and warranty requirements shall not be included in QAPs, such as mandatory requirements or instructions to a Government Contract Administration Office.

40.4 Drawings requiring QAPs. Where there is no existing Military specification or standard, or non-Government standard for an item, QAPs shall be prepared in support of end-product drawings.

40.4.1 QAP preparation. QAPs shall be prepared and maintained on drawings or on a quality assurance document referenced on the drawing. Where QAPs are prepared on separate documents to be referenced on the drawing (See 101.18.3h) the format of the QAP document shall be as directed by the design or procuring activity.

40.5 Methods of inspection. Methods of inspection, for example first article, quality conformance or other inspections, and associated description of tests and methods of analysis shall be detailed on all QAPs to the extent necessary to ensure conformance to the drawing requirements and that the tests are properly conducted. Such detail shall include as necessary: the location and number of tests, test equipment and materials, test routine, number of samples to be tested, and criteria for determining conformance to the stated requirements. Test methods appearing in Military or non-Government standards shall be included by reference.

APPENDIX C

40.5.1 Grouping of quality conformance inspections. Quality conformance inspection "Groups" shall be in conformance to MIL-STD-961.

40.6 Toxicological products. When the drawing requirement requires review of toxicological products or formulations, a statement similar to the following will be included in QAPs:

"Toxicological product formulations shall be available for review by the contracting activity to evaluate the safety of the material for the proposed use."

40.7 Classification of characteristics. Classification of characteristics, critical, major or minor, and associated numbering shall be in accordance with DOD-STD-2101.

40.8 Sampling for quality conformance inspection. Unless otherwise specified, sampling procedures, inspection level (acceptance quality levels), and lot tolerance percent defectives shall not be included as QAP requirements. Detail regarding selection and use of specific sampling and acceptance procedures shall be specified as a contractual requirement.

40.9 Specifying characteristics. The QAP symbol shown in Figure C-1 shall be placed next to each characteristic classified as critical or major in accordance with DoD-STD-2101.

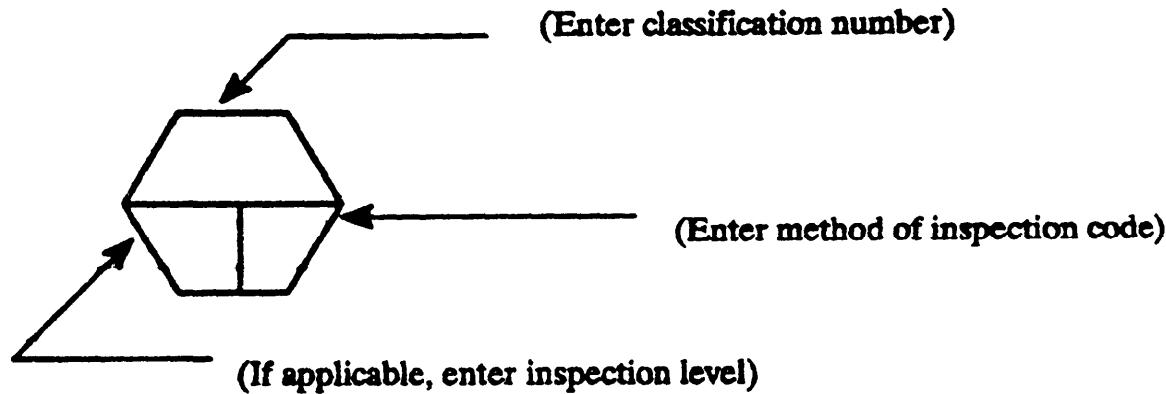


FIGURE C-1. QAP symbol

APPENDIX C

40.10 QAP notes on drawings. The use of the QAP symbol and characteristic designations shall be explained on drawings containing QAP symbols by placing QAP notes and legends on the drawing as shown in Figure C-2. The characteristic classification designations used on the drawing shall be entered as indicated in Figure C-2, Note E.

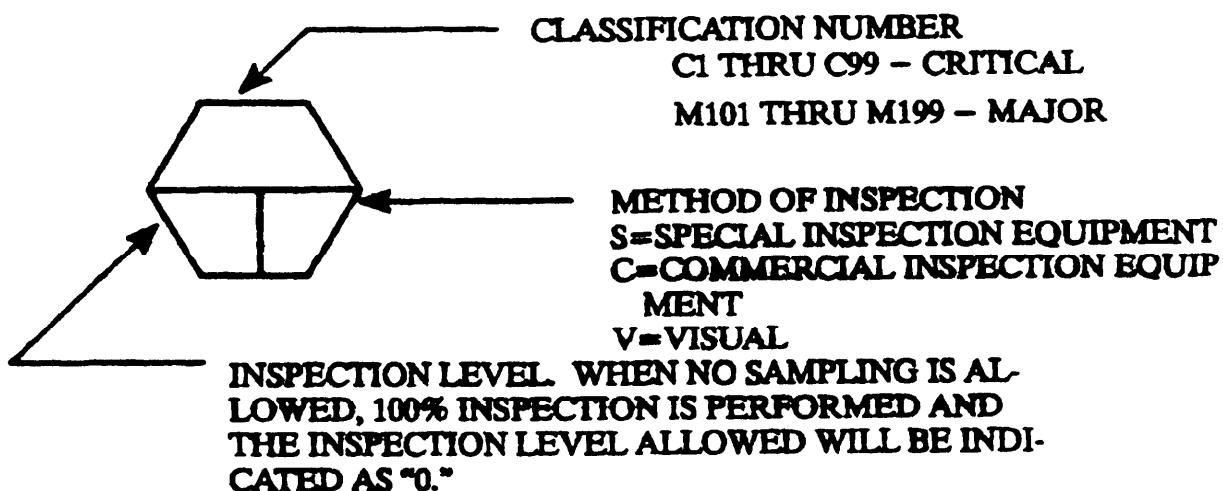
40.10.1 Compliance with specifications. Drawing notes requiring compliance with material and process specifications which contain a section entitled "Quality Assurance Provisions" shall not be classified as critical, major or minor, unless tighter control or inspection is necessary. The quality assurance requirements within those specifications shall control the inspection of characteristics. If tighter control or inspection is required for a specific application of such a specification, it shall be indicated in the drawing note and the specific change in inspection criteria stated in the QAPs on the drawing.

APPENDIX C

NOTES:

A. UNLESS OTHERWISE SPECIFIED IN THE CONTRACT OR PURCHASE ORDER, THE CONTRACTOR IS RESPONSIBLE FOR THE PERFORMANCE OF ALL INSPECTION REQUIREMENTS (EXAMINATIONS AND TESTS) AS SPECIFIED HEREIN. EXCEPT AS OTHERWISE SPECIFIED IN THE CONTRACT OR PURCHASE ORDER, THE CONTRACTOR MAY USE HIS OWN OR ANY OTHER FACILITIES SUITABLE FOR THE PERFORMANCE OF THE INSPECTION REQUIREMENTS SPECIFIED HEREIN, UNLESS DISAPPROVED BY THE GOVERNMENT. THE GOVERNMENT RESERVES THE RIGHT TO PERFORM ANY OF THE INSPECTIONS SET FORTH HEREIN WHERE SUCH INSPECTIONS ARE DEEMED NECESSARY TO ENSURE SUPPLIES AND SERVICES CONFORM TO PRESCRIBED REQUIREMENTS.

B. CLASSIFICATION OF CHARACTERISTICS AND INSPECTION REQUIREMENTS ARE IDENTIFIED ON THIS DRAWING AS FOLLOWS:



C. SAMPLING INSPECTION MAY BE ALLOWED AT THE DISCRETION OF THE PROCURING AGENCY. ALL SAMPLING PLANS SHALL BE BASED ON A ZERO FAILURE LOT ACCEPTANCE CRITERIA AND SUBMITTED TO THE GOVERNMENT FOR APPROVAL. WHERE SAMPLING IS NOT ALLOWED, 100% INSPECTION MUST BE PERFORMED. THROUGH AN EFFECTIVE STATISTICAL PROCESS CONTROL PROGRAM, BOTH SAMPLING OR 100% INSPECTION MAY BE REDUCED OR ELIMINATED.

D. QUALITY CONFORMANCE INSPECTION SHALL CONSIST OF THOSE CHARACTERISTICS CLASSIFIED AS MAJORS NUMBERS M101, M102, M103, M104, AND M105. (NOTE: IF THE DRAWING CONTAINS CRITICAL OR MINOR CHARACTERISTICS, THEY SHALL ALSO BE LISTED IN THIS NOTE.)

FIGURE C-2. Example of QAP notes on drawings.

APPENDIX C

40.10.2 Method of inspection. The method of inspection shall be indicated as follows:

- a. When special inspection equipment is used to perform an inspection or test, the code "S" shall be entered in the QAP symbol. The QAP notes shall identify the special inspection equipment by part number and the specific characteristics for which it is used.
- b. When commercial inspection equipment is used to perform an inspection or test, the code "C" shall be entered in the QAP symbol.
- c. When the inspection or test is to be performed visually, the code "V" shall be entered in the QAP symbol.

40.11 Unspecified characteristics. Characteristics determined to be provided for producibility or manufacturing convenience only, or that are adequately inspected by the quality assurance requirements of specifications shall not be designated for inspection with a QAP symbol. When a drawing contains only these types of characteristics, the following note shall be placed on the drawing in lieu of the notes and legends required by 40.10.

"NOTE: QUALITY ASSURANCE PROVISIONS. All characteristics are subject to inspection under the contractor's inspection or quality system."

APPENDIX D

QUALIFICATION PROVISIONS FOR SOURCE CONTROL DRAWINGS

10. GENERAL.

10.1 Scope. Qualification provisions for source control drawings are required pursuant Public Law 98-525, Title XII, Defense Procurement Act of 1984. The detail contained herein is to be followed prior to and during the process of approving sources of supply for inclusion on source control drawings. The detail provided also impacts drawing maintenance and the essential requirement of insuring spare part availability and logistics support. Issues or inquiries pertaining to sources of supply or the associated approval process for a particular source control drawing should be directed to the current Government design activity as identified by the CAGE Code (previously referred to as FSCM) indicated on the drawing. This Appendix is a mandatory part of this standard for Government activities. The information contained herein is intended for compliance by Government activities. See 40.12

20. APPLICABLE DOCUMENTS. This Section is not applicable to this Appendix.

30. DEFINITIONS.

30.1 Qualification. The entire process by which items to be purchased are tested, prior to any actual procurement action, to ensure the item satisfies the specified requirements.

30.2 Small business. A industrial entity satisfying the requirements of 13 Code of Federal Regulations 121.

30.3 Source control drawing. A source control drawing provides an engineering description and acceptance criteria for purchased items that require design activity imposed qualification testing and provides performance, installation and interchangeability specific characteristics required for critical applications. It includes a list of approved manufacturers, the manufacturers' item identifications, and acceptance criteria for items which are interchangeable in specific applications. The source control drawing establishes item identification for the controlled item(s). The approved items and sources listed on a source control drawing are the only acceptable items and sources (ASME Y14.24M).

30.4 Source of supply. For the purposes of this Appendix, a manufacturer approved for listing on a source control drawing.

30.5 Testing Laboratory. A laboratory having facilities to perform the qualification examination and testing. This laboratory may be one of the following:

APPENDIX D

- a. Government operated or contract laboratory. A laboratory operated by, or under contract to, the Government.
- b. Laboratory not operated or contracted for by the Government. A laboratory operated by or having contract with a manufacturer or distributor.

40. GENERAL REQUIREMENTS.

40.1 Purpose. It is the objective of this Appendix to provide detailed instructions concerning: the process of approving manufacturing sources of supply for inclusion on source control drawings and provisions for retention of approved source of supply status. It is further intended that the detail contained herein serves to standardize a product qualification process that is independent of end item application and procurement needs.

40.2 Intent. The requirements contained herein apply qualification provisions to source control drawings. It is the intent of qualification to provide the Government products of requisite quality, reliability or safety through testing prior to and independent of award of contract. Such pretesting is in recognition of a complexity of performance requirements and sensitivity of design or end item application that render it impractical to rely on first article and acceptance testing. Qualification is intended for use in support of multiple acquisition and repetitive procurement by the Government and associated contractors.

40.3 Government source control drawings. The provisions stated in this Appendix apply to the Government's use and management of source control drawings that:

- a. Are developed by or for the Government.
- b. Are identified with a Government CAGE Code and document number, or
- c. The Government owns the drawing original.

40.4 Qualification focal point. The application of qualification procedure, process and instruction in an equitable manner, independent of program management or product necessitates candidate manufacturer access to a focal point within the design activity. The focal point must be responsive to industry request for qualification with specific procedural instruction, capable of directing candidate suppliers to appropriate Government approved or operated laboratories for testing, knowledgeable in the invoking of qualification provisions as contained in this Appendix and conveniently accessible and communicative to manufacturers, contractors, program managers and user industries or Government activities.

APPENDIX D

40.5 Multiple sources of supply. Prior to concurring with or the establishing of a source control drawing, the design activity must insure the availability of two or more manufacturing sources. Single source-control drawings require specific approval from the Government design activity.

40.5.1 Existing drawings. Existing single-source, source control drawings shall be periodically (every two years unless otherwise specified by the design activity) reviewed for possible conversion to other than source control if still required in support of procurement. If still required as source control drawings, additional sources of supply shall be developed in accordance with the provisions of 50.2.

40.6 Significance. The listing of a manufacturer as a source of supply on a source control drawing signifies only that, at the time of examination or test, the manufacturer could make a product that met the drawing requirements. Inclusion of a source of supply on a drawing:

- a. Does not in any way relieve a contractor of contractual obligations to deliver products that comply with all drawing requirements.
- b. Does not guarantee acceptability of products delivered under a contract.
- c. Does not constitute a waiver of any requirement for inspection, for process control, or for maintenance of quality control procedures during production.

40.7 Manufacturer's obligation. It is the responsibility of the manufacturer to maintain adequate process and quality control procedures during production. The manufacturer is required to report any discrepancies disclosed during periodic reexamination of its product and production process controls. The manufacturer must ensure that delivered items conform to the requirements for quality, reliability, and all other specified product characteristics and conform to the design indicated on the drawing.

40.8 Government obligations. Government surveillance, initial or periodic, conducted by the design or procuring activity or their agent, does not relieve the manufacturer of the responsibility to exercise adequate process and product quality control procedures. The Government design or procuring activity will establish the single focal point as per 40.4 to consolidate findings and recommend corrective actions for problems associated with sources of supply on source control drawings.

40.8.1 Approved sources of supply. A manufacturer whose product has been screened and tested in accordance with the

APPENDIX D

applicable drawing will be considered qualified as a source of supply for the item whether or not inclusion thereon has been accomplished. Accordingly, it shall be the responsibility of the design activity to maintain a current record of sources of supply that have not been included (for example drawing revision through Engineering Change Proposal) on the actual drawings. Award of contract will include consideration of all approved sources of supply including those that have not yet been listed on the drawing.

40.9 Effecting changes to drawings. The addition of manufacturing sources of supply to a drawing or changes required to such listing, for example manufacturer's name, address or product designation, requires that the drawing be revised in accordance with Chapter 600.

40.10 Advertising. A manufacturer may advertise source of supply status. However it must not be stated or implied in advertising that a product is the only type so qualified or that the DoD in any way recommends or endorses the product or source of supply status. Violation of this provision is cause for deletion from the drawing.

40.11 Qualification authority. The authority for developing and approving sources of supply for listing on control drawings rests solely with the design or procuring activity. No using activity may use manufacturing sources other than that listed on the drawing without the concurrence of the design or procuring activity.

40.12 Qualification and award of contracts. With respect to manufacturers requiring qualification, award of contract will be made only for manufacturing sources which are, prior to the award of contract, approved for inclusion on the applicable drawing whether or not such sources have actually been listed by that date. The attention of potential suppliers is called to this requirement, and manufacturers are urged to arrange qualification per this Appendix for those products, they propose to offer the Government, sufficiently in advance in order that they may be eligible to be awarded contracts or orders for the products covered by the applicable drawing.

Information pertaining to approval of manufacturers for inclusion on source control drawings should be obtained from the design or procuring activity.

40.13 Advertising and notices. Advisory data to industry relative to source control drawings, (release of new drawings, drawing revisions, test program initiation, changes in scheduled qualification changes, and changes in Government requirements) is publicized by sending notice to:

APPENDIX D

U.S. Department of Commerce
433 West Van Buren Street
Room 1304
Chicago, Illinois

Requests for publication made to the Commerce Business Daily should include the telephone number of the originator and, if applicable, a cut-off date for receipt of requests for qualification testing.

50. DETAILED REQUIREMENTS.

50.1 Determinations to be made by the design or procuring activity. In order to insure compliance with the provisions contained herein the design or procuring activity must determine that:

- a. There is no other satisfactory procurement vehicle (existing military specification, standardized military drawing or vendor item control drawing) for obtaining the required products other than producing a source control drawing.
- b. Two or more manufacturers are able and willing to qualify as sources of supply. See 40.5.
- c. Test facilities and resources (normally furnished or arranged by the manufacturer) are available to establish and maintain the qualified sources of supply.
- d. The costs of qualification are justified by the Government's needs.

50.2 Publicity. The approval of new source control drawings, technical content revision of existing drawings and the development of multiple sources of supply is a matter of public knowledge and notification. Public notice is accomplished by the following means:

- a. A notice is sent to the Commerce Business Daily (see 40.13) for publication in the synopsis of U.S. Government Proposed Procurements Sales and Contract Awards. The notice must be clearly marked "Qualification Test Information" and must contain the following information:
 - (1) Name of Product
 - (2) Applicable Drawing Identification

APPENDIX D

(3) Name and address of the design activity to be contacted for complete information on qualification under the drawing

b. Contact is made with manufacturers known to be interested in submitting products for qualification under the applicable drawing and with manufacturers known to supply the desired type of product. Known related trade associations are also notified in order to effect widespread publicity.

The notice published in conformance to the above is to be advertised in the context of the intention to approve a new "source control drawing" or development of "additional sources for single source drawings".

50.2.1 Additional notice to industry. In addition to that indicated in 50.2 and at the discretion of the design activity, notices in the following form are sent to commercial journals and trade publications of the industry concerned through established channels for news releases:

"The (service or command), Department of the (Army, Navy, or Air Force), has announced the intention to establish (source control drawing, XXXXXXXX, titled...). Manufacturers which have a product meeting the requirements of this drawing are urged to contact (name and address of design activity) for an opportunity to test their products, since future acquisition awards will be made only to such sources of supply as have been approved for inclusion on the drawing. The cutoff date for applying to have products tested in order to become an approved source of supply in the initial issue of the drawing is (Date)." (The date is to be provided by the design activity.)

To promote competition, the notice specified above should be sent to all firms or individuals considered to be potential suppliers.

50.3 Application for qualification. Each application for qualification must be addressed to the design activity identified on the applicable drawing and includes as a minimum, the following information:

- a. Drawing number, PIN, and associated title under which testing is desired including any type, grade or class designation.
- b. Applicant's brand designation or item identification for the product and exact location (including complete street address) of the plant at which the product was manufactured.

APPENDIX D

c. If testing is to be conducted in other than a Government operated or contract laboratory the following information shall also be furnished:

- (1) Location of plant or other facility at which tests are proposed to be performed. If more than one facility is available, list in the order of applicant's preference.
- (2) With the initial application only, a list and description of testing equipment proposed to be used including the following:
 - (a) Applicable drawing requirements.
 - (b) Equipment name and manufacturer including type or model number and serial or inventory number.
 - (c) Equipment accuracy, limits, and latest date and place of calibration; frequency of calibration; and (when specifically requested) traceability of calibration to national or other recognized standards.

d. Certification that the applicant:

- (1) Agrees to be bound by all of the provisions and terms set forth in this standard.
- (2) Is the manufacturer of the product.
- (3) Has determined from actual tests (within the limits of test equipment commonly available, unless otherwise specified) that the product conforms to the applicable drawing. (Test reports and data should be furnished with the application.)
- (4) Will supply items for test which are randomly selected samples from the manufacturer's normal production.
- (5) Will supply products which meet the requirements of the drawing in every respect.
- (6) Is prepared to overcome deficiencies disclosed by qualification tests.

APPENDIX D

- (7) Will not apply for a retest of the product until satisfactory evidence is furnished that all of the defects which were disclosed by previous tests have been corrected. (Test reports may be required as evidence.)
- (8) Will not state or imply in advertising or otherwise that a product(s), which has received Department of Defense Qualification Approval, is the only product of that type so qualified, or that the Department of Defense in any way recommends or endorses the product.
- (9) Will notify the design activity of any change in his product (design, materials, or process) after qualification approval. The applicant will also state at the same time, whether:
 - (a) In his belief the change will or will not prejudice the capability of the product to meet the drawing requirements.
 - (b) He intends to submit new samples for testing or (after qualification approval) desires to have his company removed from the drawing.
 - (c) The changes will affect the applicant's brand designation for the product.
- (10) Will, when requested by the design activity, submit certification signed by a responsible official of management, attesting that the tested product(s) is still available from the listed plant, can be produced under the same conditions as originally qualified, i.e., same process, materials, design, manufacturer's part number or designation and meets the requirements of the current issue of the drawing.

50.3.1 Additional information. In certain cases where information required by 50.3 is considered by the design activity as insufficient to justify authorization for testing or approval as source of supply the applicant will be required to supply at no cost to the Government, the following information:

- a. The rate at which the product can be produced with the present plant facilities.
- b. Sketches, photographs, descriptive booklets, or other technical literature bearing upon his product, as illustrative of the scope of his manufacturing facilities which will assist in obtaining a clear conception of the product he is offering.

APPENDIX D

c. Such additional information as is required by the applicable drawing.

50.3.2 Additional or limited rights data. When specified, the applicant will furnish at no cost to the Government, for test record purposes, copies of any detailed plans, test results, or other data required. Government requests for this data must include instructions to the applicant that limited rights data or data that the applicant does not want disclosed to the public or used by the Government for purposes other than qualifying the product should be marked with the following statement:

"These data are considered by the supplier to be submitted in confidence and furnished for the purpose of facilitating qualification testing and are not to be disclosed outside the Government or be duplicated, used, or disclosed in whole or in part, for any purpose other than to evaluate the product submitted for qualification testing. This restriction does not limit the Government's right to use information contained in such data if it is obtained from another source without restriction."

Each item of data and each sheet that contains data to be protected is to be marked with the above statement.

50.4 Authorization for qualification. After having received letter response and data, as required by the design activity, satisfying the requirements of 50.3, the design activity, without delay, will authorize initiation of testing and product inspection. Included with the letter of authorization will be a copy of the latest drawing, a schedule of testing costs, if applicable, and facilities survey requirements (see 50.6), if applicable.

50.5 Qualification data. Data generated for the purpose of qualification is forwarded by the manufacturer to the design activity for review and approval.

50.5.1 Action on test data. Upon completion of laboratory tests, the results will be analyzed by the design activity to determine if the product is qualified. The manufacturer will be notified concerning the results of the tests of his product, and whether or not the product qualifies under the requirements of the applicable drawing.

50.5.2 Authorization for retest. In the event that qualification is disapproved or testing is discontinued, retesting of the product will not be authorized until satisfactory evidence is furnished to the design activity or its authorized agent that all of the defects which were disclosed by previous tests have been corrected. The design activity is solely responsible for determining whether the evidence is satisfactory.

50.5.3 Prior test data. Unless otherwise specified by the design activity, data generated prior to the date of actual request for qualification will not be acceptable.

APPENDIX D

The applicability of all test data to the development of sources of supply for inclusion on source control drawings will ultimately be at the discretion of the design activity.

50.6 Facilities survey. Whenever the design activity requires facilities surveys, the survey will be conducted prior to authorization of test and applies to both domestic and foreign manufacturers. Facilities surveys will be conducted when specified by the design activity. Detailed requirements for these surveys will be specified by the design activity. Requirements may include survey of inspection systems, quality and reliability assurance programs, test facilities, production facilities, and line certifications. The survey will verify that the manufacturer has an effective self-audit program. If the survey has within its scope proprietary products or processes, this portion of the survey must be performed by, and any access to the limited rights information thereby exposed must be limited to, employees of the Government who have a need to know the information.

50.7 Retention of approved source of supply status. At the request of the design or procuring activity, approved sources of supply will periodically (usually every two years or as otherwise specified by the design activity) be required to certify to product availability, manufacturing location and process, materials and design, and product conformance to the applicable drawing. Source of supply certification response will identify changes made to product after qualification and justification as to why such changes should not be cause for removal from the drawing. Failure to respond to the design activity request for certification will be cause for removal of that source of supply from the drawing.

50.7.1 Drawing revision. Source of supply certification by the design activity will be initiated whenever a drawing is revised. Changes in sources of supply, product identification or manufacturer address will then be reflected on the drawing.

50.7.2 Changes in product. When an approved source of supply notifies the design activity of a change in manufacturing process, location, design or materials, the design activity will evaluate those changes to determine if re-qualification is required. Sources of supply must requalify products to existing drawings at the direction of the design activity. Failure to requalify, after having been advised to do so, will be cause for withdrawal of approval as a source of supply.

50.8 Cost of testing. With the exception indicated in 50.8.2, the costs of tests will normally be borne by industry. The Government may act as a testing activity for commercial interests in those instances when the Government derives commensurate,

APPENDIX D

identifiable benefit from such testing. The Government will not bear any of the costs of testing incurred in connection with qualification tests performed in laboratories not operated or contracted by the Government. The costs of performing qualification tests in Government operated or contract laboratories may be shared (prorated) between the Government and applicant or wholly borne by the Government whenever charges for performance of tests are so large as to discourage requests for qualification. The charges will include both direct and indirect costs. A schedule of charges will be uniform for all applicants.

50.8.1 Changes in cost of testing. Changes in scheduled charges for qualification to any drawing will be advertised in the Commerce Business Daily (see 40.13).

50.8.2 Charges for small business concerns. If the number of sources listed on a given drawing, available to compete actively for an anticipated future requirement, is fewer than two actual manufacturers, the cost of the initial qualification testing for a small business concern(s) may be paid for by the design activity. This provision is applicable if the small business concern successfully passes the qualification requirements and tests specified in the applicable drawing. Also, this provision is applicable if it is determined that such additional sources for products are likely to result in cost savings from increased competition for future requirements that exceed the costs associated with qualification testing. The costs associated with producing the items and establishing production control systems are not reimbursable. A projected ten percent reduction of procurement expenditures for the item in question over the next three years is the accepted guideline utilized for determining cost savings when supply sources are increased from one to two.

50.8.3 Charges for retesting. The applicant will be required to pay the entire cost, or a large share of the cost, of retesting his product after initial failure, providing that each applicant is so advised in the initial authorization to submit samples. The charges for retest will be uniform for all applicants.

50.9 Availability of data. Only that data derived at Government expense will be considered for distribution. After determination that such action is in the best interest of the Government, and in keeping with current security policy and regulations, the design activity may, at its discretion and acting upon specific request:

- a. Supply the data to other activities of the Government.
- b. Supply the data to foreign Governments which are purchasing, operating, or maintaining supplies that involve products covered by the drawing. Such

APPENDIX D

release will be made with the condition that the information shall be used only in connection with furnishing supplies and services to that Government.

50.10 Data derived at industry expense. Data derived in support of qualification, at private industry expense shall not be distributed without written authority from the source of supply involved. The design activity after receiving permission to release such data, will do so using 50.9 as guidance.

50.11 Deletion of a source of supply. An approved source of supply is subject to deletion from a drawing by the design activity under any one of the following circumstances:

- a. The product offered under contract does not meet the requirements of the drawing.
- b. The manufacturer has discontinued manufacture of the product, or has changed design, materials, or processes to such an extent that the product no longer meets the requirements of the drawing.
- c. The manufacturer requests that the product be removed from the drawing.
- d. One or more of the conditions under which qualification was granted have been violated.
- e. The requirements of a revised drawing differ sufficiently from the previous issue so that existing test data are no longer applicable for determining compliance of the product with the drawing.
- f. Failure of a manufacturer to notify the design activity of a change in design material, manufacturing, process (including quality control), or plant location.
- g. The product is that of a manufacturer, firm or individual whose name appears on "The Consolidated List of Debarred, Suspended and Ineligible Contractors".
- h. The manufacturer has not complied with the requirements of 50.7.
- i. The manufacturer marks the product in accordance with the drawing or with other markings in such a manner as to indicate that the product meets all requirements of the drawing when the product does not meet all such requirements.

APPENDIX D

- j. The manufacturer has publicized that his qualified product is the only one of its type so qualified or that the Government has endorsed it.
- k. The manufacturer, upon invitation, has failed or declined to bid on Government contracts for the product for ten consecutive solicitations or for a period of two years during which solicitations were issued, whichever is less.

50.11.1 Procedures for removal. The following procedures apply in removing a source of supply from a drawing:

- a. If the decision to remove source of supply from a drawing is made for reasons indicated in subparagraphs a, d, f, h, i, or j above, consideration will be given to the circumstances which gave rise to that action. The manufacturer will again be listed on that drawing once the deficiencies noted have been corrected to the Government's satisfaction. Factors to be considered by the design activity in making that determination are the seriousness of the deficiencies noted, the circumstances under which those deficiencies came to light (i.e., Government audit, voluntary disclosure), and whether circumstances indicate that such actions were intentional or fraudulently motivated or reflect a repeated or continuing course of conduct.
- b. When a manufacturer is removed from a drawing, that manufacturer shall be sent a written notice (registered, with a return receipt requested) of the action taken, the reasons therefor, and an opportunity to respond to that notice. Unless the notice indicates otherwise, removal of a manufacturer from the drawing shall be effective immediately.

50.11.2 Notification of removal. After a determination has been made to remove a manufacturer from a drawing, that manufacturer will be sent a notice of the intent to perform that action and actual drawing revision shall proceed without delay. If removal is for reasons in 50.11 above, the manufacturer will be advised of action required in order to remain an approved source of supply on the revised drawing.

50.11.3 Publication of removal. When action has been taken by the design activity to effect the removal of a source of supply from a drawing, the design activity will determine whether it would be in the Government's interest to publish in the Commerce Business Daily and known related trade publications, a notification to Government organizations and contractors that the product has been removed by adverse action. When in the Government's interest, the design activity will publish such notification as soon as practicable. The notification will be in a form similar to that below:

APPENDIX D

Drawing Number:

Title:

Notification is herewith given that the following vendor was removed from
(drawing number) on (date) :

(Name of Government Representative)
(Title of Government Representative)
(Name of Government Installation)
(Address of Government Installation)

50.12 Foreign manufacturers. If the manufacturer is of foreign origin, the letter of notification of qualification will state that acquisition will be subject to all official agreements made by the Government, laws, and policies affecting acquisition of foreign-made products, in addition to the requirements of 50.3. Testing of products from foreign sources shall take place at a facility in the U.S. that is satisfactory to the design activity.

50.12.1 Reciprocal qualification agreements. The recognizing of foreign products through reciprocal agreements between various countries, in lieu of actual qualification, does not apply to the process of approving sources of supply to control drawings.

A

Abbreviations 101.12.16,100-4

Acceptance 3.2,14

Acquisition requirements 6.2,27

Acronyms and abbreviations used in this standard. 3.1,11

Action on test data 50.5.1,D-9

Adding items 704.6,700-2

Additional blocks and columns 704.10,700-3

Additional information 50.3.1,D-8

Additional notice to industry 50.2.1,D-6

Additional or limited rights data 50.3.2,D-9

Adopted items 3.3,14

Advertising 40.10,D-4

Advertising and notices 40.13,D-4

Air Standardization Coordinating Committee (ASCC), Air Standards (AIRSTDs) 6.3.1,33

Altered item 3.4,14

Altered item drawing 204.1,200-2

Altered item drawing (one-time programmable devices and media requirements). 204.2.6.4.1,200-8

Altered item drawing (one-time programmable devices and multi-programmable devices used as one time programmable) 204.2.6.4,200-8

Altered, selected, or source control item identification 101.16.1.4,100-7

American, British, Canadian, Australian (ABC) Army Standardization Program, Quadripartite Standardization Agreements (QSTAGs) 6.3.2,33

Ancillary drawings 204.1,200-2

Aperture card signature and revision history block 40.3.2.1,A-2

Applicability 5.1,26

6.1.1,27

Applicable documents 2,2

20,A-1

20,B-1

20,C-1

20,D-1

Application 202.3.1,200-2

Application data 101.1.3,100-1

Application for qualification 50.3,D-6

Application of security classification 40.1.2,B-1

Application. 10.2,C-1

101.5.1,100-2

204.2.6.2.1,200-7

Approval 605.1,600-1

Approval of computer generated drawings 40.3.2,A-2

Approved item name 3.5.14

Approved item names 301.1,300-1

Approved sources of supply

40.8.1,D-3

Arrangement drawing

204.1,200-2

Artwork master

204.1,200-3

3.6,14

Assemblies containing multi-programmable

devices

204.2.6.3,200-8

Assembly

3.7,14

301.3,300-1

Assembly drawing

204.1,200-2

204.1,200-3

Assigning classification

40.1.1,B-1

Associated list

3.8,14

201,200-1

40.4,A-2

406.8,400-5

700-1

Associated lists and drawings in book-form

101.18.5.1,100-9

Associated lists, materials

101.14.2.3,100-5

Authentication, parts, data, and index lists

704.11,700-3

Authorization for qualification

50.4,D-9

Authorization for retest

50.5.2,D-9

Availability of data

50.9,D-11

B

Basic practices

101,100-1

Block and column size and arrangement

704.9,700-3

Book-form requirements and limitations

202.2.1,200-1

Bulk items

3.9,14

Bulk items identification

406.15.4,400-11

C

Cable assembly drawing

204.1,200-3

CAD reproductions

508,500-4

CAGE Code

406.4,400-2

CAGE Code as a prefix

406.11.2,400-8

Camouflage basis drawing

204.2.7,200-8

Camouflage basis drawing requirements

204.2.7.1,200-9

Camouflage pattern drawing

204.2.8,200-10

Camouflage pattern drawing requirements

204.2.8.1,200-10

Castings and forgings

101.11,100-2

Change requiring new identification

406.13,400-9

Changes from previous issue

6.7,36

Changes in cost of testing

50.8.1,D-11

Changes in product

50.7.2,D-10

Changes not requiring new identification

406.14,400-10

Changes not requiring revision level

advance

604.1,600-1

Charges for retesting

50.8.3,D-11

Charges for small business concerns

50.8.2,D-11

Chemical Agent Resistant Coating (CARC)

3.10,15

Classification of characteristics
40.7,C-3

Code Identification
3.11,15

Code Identification, FSCM & CAGE Code
101.24,100-12

Color of security markings
40.1.4,B-2

Column 10, quantity required (mandatory)
705.4.2,700-4

Column 11, CAGE code (mandatory)
705.4.3,700-4

Column 12, part or identifying number (PIN) (mandatory)
705.4.4,700-4

Column 14, drawing or (procurement) document number column (mandatory)
705.4.5,700-5

Combination of adopted items drawing
204.2.4,200-5

Combination of adopted items drawing requirements
204.2.4.1,200-5

Combination of drawing types
202.3,200-2

Combination of items
3.12,15

Commercial and Government Entity (CAGE) Code
3.13,15
401,400-1

Commercial item
3.14,15

Commonly used words and phrases
101.18.2,100-8

Compliance with specifications.
40.10.1,C-4

Computer generated drawings
40.2,A-1

Computer program
406.13.1,400-10

Connection or wiring diagram
204.1,200-3

Continuing the recording of revision
605.3,600-2

Contour definition drawing
204.1,200-3

Contract
3.15,15

Contracting Activity
3.16,16

Contractor
3.17,16

Contractual and administrative requirements
40.3,C-2

Control drawings
204.1,200-2

Copy
3.18,16

Cost of testing
50.8,D-10

Coverage
4.1,25

Critical safety characteristic
3.19,16

Critical safety item (CSI)
3.20,16

Current design activity (CDA)
3.21,16

D

Data derived at industry expense
50.10,D-12

Data list (DL)
702,700-1

Data preparation, maintenance, delivery, or access
101.14,100-4

Dating drawings
101.20,100-11

Decimal-inch
101.1.2,100-1

Definitions
3,11
30,A-1
30,B-1
30,C-1
30,D-1

- Deleting items
704.5,700-2
- Deletion of a source of supply
50.11,D-12
- Department of Defense Index of Specification and Standards (DODISS)
3.22,16
- Design activity
3.23,16
- Design activity identification
704.8,700-3
- Design activity, current or original
6.4.2,35
- Detailed drawings
204.1,200-2
- Detailed requirements
5,26
50,D-5
- Determinations to be made by the design or procuring activity
50.1,D-5
- Diagrams
101.13,100-4
- Digital data
101.14.2,100-5
3.24,17
- Dimensioning and tolerancing
101.5,100-2
- Disclosure of security categories
303,300-6
- Distribution statement
3.25,17
- DL entries
706.3,700-6
- DL format
706.1,700-5
- DL organization
706.2,700-6
- DL preparation.
706,700-5
- Document
3.26.17
- Drawing (engineering)
3.27.17
- Drawing copies derived from exchanged digital data
510,500-4
- Drawing format
3.28,17
- Drawing identification
403,400-1
6.4.1,35
- Drawing marking for item identification
101.16,100-6
- Drawing notes
101.18,100-7
- Drawing notes, contents
101.18.6,100-9
- Drawing number
402,400-1
- Drawing number structure
406.5,400-3
- Drawing ownership
6.4.3,35
- Drawing ownership and drawing identification
6.4,35
- Drawing practices
602,600-1
- Drawing requirements for part identification marking
101.16.1,100-6
- Drawing revision
50.7.1,D-10
- Drawing supersession.
608,600-4
- Drawing titles
300-1
301,300-1
- Drawing types
204,200-2
- Drawing verification and approval
101.19,100-11
- Drawings for bulk items
406.15.4.1,400-11
- Drawings in book-form
202.2,200-1
- Drawings not to scale
101.15.3,100-6

Drawings of multiple items

502.3,500-3

Drawings requiring QAPs.

40.4,C-2

Duplicate original

3.29,17

506,500-4

Duplicate production master (stable base artwork)

507,500-4

E

Effecting changes to drawings

40.9,D-4

Electrical and electronics diagrams

101.13.1,100-4

Electrical/electronic diagrams

204.1,200-3

End-product (end-item)

3.30,17

Engineering data

3.31,17

Envelope drawing

204.2.2,200-4

Established symbology

501.3.1,500-1

Exceptions to boxed symbols

501.5,500-2

Existing drawings

40.5.1,D-3

Existing drawings and associated lists

406.2,400-2

F

Facilities survey

50.6,D-10

Feature identification

501.2,500-1

Federal Supply Code for Manufacturers

(FSCM)

3.32.17

Film, Diazotype

101.14.1.3,100-5

Find number

405,400-2

Find number or item number

3.33,17

Firmware

3.34,17

First part of title

302.2,300-2

Foreign manufacturers

50.12,D-14

Formulation identification

406.15.3,400-11

Functional block diagram

204.1,200-3

G

Gears

101.8,100-2

General

10,A-1

10,C-1

10,D-1

300,300-1

400,400-1

600,600-1

700,700-1

General requirements

4,25

40,A-1

40,B-1

40,C-1

40,D-2

704,700-1

General rules

302.1,300-2

General.

10,B-1

100,100-1

200,200-1

500,500-1

Government design activity (GDA)

3.35,18

Government documents

20.1,C-1

Government documents
2.1,2
20.1,B-1

Government obligations
40.8,D-3

Government source control drawings.
40.3,D-2

Government specific.
204.2,200-4

Graphic symbols
101.12.1,100-3

Graphic symbols for aircraft hydraulic and pneumatic systems
101.12.8,100-3

Graphic symbols for electrical and electronics diagrams
101.12.2,100-3

Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction
101.12.6,100-3

Graphic symbols for flowchart diagrams
101.12.4,100-3

Graphic symbols for fluid power diagrams
101.12.5,100-3

Graphic symbols for fluid power diagrams
101.12.12,100-4

Graphic symbols for logic functions
101.12.3,100-3

Graphic symbols for plumbing fixtures
101.12.7,100-3

Graphic symbols, designations, letter symbols and abbreviations
101.12,100-2

Group
3.36,18

Group identification
406.15.1,400-11

Grouping of quality conformance inspections.
40.5.1,C-3

Hardness critical note.
501.6 1.500-2

Identification cross reference
406.10.1,400-7

Identification cross reference drawing
204.1,200-2

Identification marking location and size
101.16.1.1,100-6

Identification of materials, processes, and protective treatment
406.15,400-10

Identification requirements
406,400-2

Identifying substitute parts
503,500-3

IL entries
707.3,700-7

IL format
707.1,700-6

IL preparation
707,700-6

Indefinite terms
101.18.4,100-9

Index list (IL)
703,700-1

Indication of scale
101.15.2,100-6

Industry standard
204.1,200-2

In-house peculiar information
101.22,100-12

Initial and signature blocks
40.3,A-1

Initial Graphics Exchange Specification (IGES)
101.14.2.5,100-5
3.37,18

Inseparable assembly
3.7.1,14
406.12.3,400-9

Inseparable assembly drawing
204.2.1.200-4

Inseparable assembly drawing requirements
204.2.1.1,200-4

Installation drawing
204.1,200-2

Intended use
 6.1,27

Intent.
 40.2,D-2

Interchangeable item
 3.38,18

Interchangeable items
 502.1,500-2

Interconnection diagram
 204.1,200-3

Interface characteristic
 3.39,18

Interface control drawing
 204.1,200-2

International agreements
 6.3,33

Isometric and pictorial views
 101.3.1,100-1

Issue of DODISS
 6.2.1,27

Item
 3.40,18

Item identification
 3.41,18

Item identification and PIN
 406.10,400-7

Item replacement notations
 502,500-2

Items and processes, special notations
 501,500-1

K

Kit drawing
 204.1,200-3

Knurling dimensioning
 101.5.2,100-2

L

Language
 101.18.1.100-8

Language style
 101.18.1.1,100-8

Layout drawing
 204.1,200-2

Letter symbols
 101.12.14,100-4

Line conventions and lettering
 101.2,100-1

List preparation
 704.1,700-1

Lists prepared from digital data
 704.1.1,700-1

Location of notes
 101.18.5,100-9

Location of security markings on associated lists
 40.1.6,B-5

Location of security markings on drawings
 40.1.5,B-3

Location of security markings on drawings in book-form
 40.1.7,B-7

Logic circuit diagram
 204.1,200-3

Logic circuit diagrams
 101.13.1.1,100-4

M

Maintaining design activity identities
 406.9.1,400-6

Maintenance
 101.14.2.2,100-5

Manual preparation
 705.3.2,700-3

Manually Prepared drawings
 40.1,A-1

Manufacturer
 3.42,18

Manufacturer's obligation
 40.7,D-3

Marking for special items and processes
 501.1,500-1

Markings on engineering drawings
 500-1

Master Drawing
 204.1,200-3

3.43,18

- Matched part designation
 - 406.12.1,400-9
- Matched parts
 - 3.44,19
- Matched set drawing
 - 204.1,200-3
- Materials
 - 101.14.1,100-4
- Mathematical signs and symbols
 - 101.12.15,100-4
- Mechanical schematic drawing
 - 204.1,200-3
- Mechanical springs
 - 101.9,100-2
- Memory device categories
 - 204.2.6.1,200-7
- Method of inspection.
 - 40.10.2,C-6
- Methods and styles.
 - 202,200-1
- Methods of inspection.
 - 40.5,C-2
- Metric
 - 101.1.1,100-1
- Metric Designs
 - 101.4.1,100-2
- Metric values
 - 101.4,100-2
- Modification drawing
 - 204.1,200-2
- Modifying drawings
 - 204.1,200-2
- Monodetail drawing
 - 204.1,200-2
- Multidetail drawing
 - 204.1,200-2
- Multiple sheets
 - 704.2,700-2
- Multiple sources of supply
 - 40.5,D-3
- Nationally recognized standard
 - 3.45,19
- New drawings and associated lists
 - 406.1,400-2
- Nondestructive testing symbols
 - 101.12.11,100-4
- Non-Government publications
 - 2.2,6
- Non-Government standard (or document)
 - 3.47,19
- Noninterchangeable items
 - 502.2,500-3
- Non-part drawing
 - 3.48,19
- Notes
 - 501.4,500-2
 - 6,27
- Notification of removal
 - 50.11.2,D-13
- Nuclear effects
 - 3.49,19
- Nuclear Hardness Critical Item (HCI)
 - 3.50,19
- Nuclear Hardness Critical Process (HCP)
 - 3.51,20
- Numbering of related parts
 - 406.12,400-9
- Numbering, coding and identification
 - 400-1

O

- Observable Critical Item (OCI)
 - 3.52,20
- Observable Critical Process (OCP)
 - 3.53,20
- Optical elements and optical systems
 - 101.10,100-2
- Optional/alternative designs
 - 101.17,100-7
- Order of precedence
 - 2.3
- Original
 - 3.54.20

N

- National Stock Number (NSN)
 - 3.46,19

Original date
3.55,20
Original design activity (ODA)
3.56,20
Other Government documents
20.1.1,B-1
Other Government documents, drawings and publications
2.1.2,5
Other identification
406.15.2,400-11
Ozone depleting chemicals
6.5,35
Ozone depleting chemicals note.
501.6.2,500-2

P

Package content drawing
204.2.5,200-6
Package content drawing requirements
204.2.5.1,200-6
Packaged items
101.16.1.3,100-7
Paper tracing
101.14.1.2,100-5
Paper, Diazotype
101.14.1.4,100-5
Part
3.57,20
Part or identifying number
404,400-1
Part or Identifying Number (PIN)
3.58,21
Parts list (PL)
701,700-1
Physical media
101.14.2.4,100-5
Pictorial and tabular delineation
204.1,200-3
Pictorial drawings
203,200-2
PIN length and application
406.6.400-5

PL entries
705.4,700-4
PL format
705.1,700-3
PL identification
705.3.1,700-3
PL preparation
705,700-3
PL requirement
705.2,700-3
Plastic sheet or roll
101.14.1.1,100-4
Plotters
101.14.2.1,100-5
Preparation of duplicate original
101.14.3,100-6
Preparation of engineering drawings
100-1
Printed board assemblies
101.16.1.5,100-7
Printed board description in digital form
101.13.3,100-4
Printed board drawing sets
204.1,200-3
Printed board drawings
101.13.2,100-4
Prior test data
50.5.3,D-9
Procedures for creating drawing titles
302,300-1
Procedures for removal
50.11.1,D-13
Procuring activity
3.59,21
Product
3.60,21
Product definition data
3.61
Production master
3.62,21
Projection systems
101.3.2,100-1
Publication of removal
50.11.3,D-13

Publicity
50.2,D-5
Purpose
40.1,D-2

Q

QAP notes on drawings.
40.10,C-4
QAP preparation
40.4.1,C-2
QAPs, general
40.1,C-1
Qualification
3.63,21
30.1,D-1
Qualification and award of contracts
40.12,D-4
Qualification authority
40.11,D-4
Qualification data
50.5,D-9
Qualification focal point
40.4,D-2
Qualification provisions for source control
drawings
D-1
Quality assurance
3.64,21
Quality assurance provisions
C-1
Quality assurance provisions (QAP)
3.65,22

R

Raster data files
101.14.2.6,100-5
Reciprocal qualification agreements
50.12.1,D-14
Recording revisions on drawings
605.600-1
Records
406.7,400-5
Redrawn drawings
607.600-4

Redrawn with or without change
607.1,600-4
Reference designations for electrical and
electronics parts and equipment
101.12.13,100-4
Reference identifiers
101.21,100-11
Reference to items
406.11,400-8
Reference to this standard
4.1.1,25
Referenced documents
3.66,22
406.3,400-2
Regrading classification
40.1.8,B-8
Removal of revision history.
605.4.1,600-2
Repair parts
3.67,22
Reparable
3.68,22
Replacement drawing
3.69,22
Reproducibility requirements
704.3,700-2
Reproductions from digitally maintained
data
509.500-4
Required revisions
604,600-1
Responsibility for inspection
40.2,C-1
Retention of approved source of supply
status
50.7,D-10
Revision
3.70,22
Revision authorization
3.71,22
Revision date
605.2,600-2
Revision description
704.7,700-3

Revision history block on lists 708,700-7
Revision history retention. 605.4,600-2
Revision identification 704.4,700-2
Revision methods requirements 601,600-1
Revision of digital data prepared lists 704.1.1.1,700-2
Revision of engineering drawings 600-1
Revision of manually prepared lists 704.1.2,700-2
Revision of multi-sheet drawings. 605.5,600-2
Revision symbols 603,600-1
Revisions to production master drawings 606,600-2
Rights in data legends on drawings 505,500-3

S

Sampling for quality conformance inspection. 40.8,C-3
Scale 101.15,100-6
Schematic or circuit diagram 204.1,200-3
Scope 1.1,1
10.1,A-1
20,B-1
10.1,D-1
10.1,C-1
Screw thread representation 101.7,100-2
Second part of title 302.3,300-6
Security classification and notation 504.500-3

Security classification markings and notations B-1
Security classifications and notations 40.1,B-1
Security markings on roll size drawings.40.1.5.1,B-3
Selected item 3.72,22
Selected item drawing 204.1,200-2
Selection of scale 101.15.1,100-6
Separate PLs 705.3,700-3
Sequence 707.2,700-6
Sequence of documents 706.2.1,700-6
Set 3.73,22
Sheet numbering 704.2.1,700-2
Ship structural symbols 101.12.9,100-3
Signatures and initials authority 40.3.1,A-2
Significance. 40.6,D-3
Signing and initialing drawings A-1
Single line diagram 204.1,200-3
Single, multiple and sectional view drawings 101.3,100-1
Size and format of engineering drawings 101.1,100-1
Size of security markings 40.1.3,B-2
Small business 30.2,D-1
SMD limitation 204.2.3.2,200-5
SMD requirement 204.2.3.1,200-5

Software and firmware data
 204.2.6,200-7

Software installation drawing
 204.2.6.2,200-7

Software installation drawing requirements
 204.2.6.2.2,200-7

Source control drawing
 204.1,200-2
 30.3,D-1

Source of supply
 30.4,D-1

Special application drawings
 204.1,200-3

Specialized notes.
 501.6,500-2

Specialized segment of industry
 3.74,22

Specification
 3.75,23

Specification control drawing
 204.1,200-2

Specifications, standards, and handbooks
 2.1.1,2

Specifying characteristics.
 40.9,C-3

Standard
 3.76,23

Standard, company
 3.78,23

Standard, military
 3.79,23

Standardization document
 3.77,23

Standardized general markup language
 (SGML)
 101.14.2.7,100-5

Standardized microcircuit drawing
 204.2.3,200-5

Subassembly
 3.80,23

Subject term (key word) listing
 6.6.36

Substitute parts or bulk items
 705.4.1.700-4

Superseded (old) drawing, same number
 608.1,600-4

Superseded drawings
 502.4,500-3

Supplemental list column (optional)
 705.4.6,700-5

Supplier
 3.81,23

Surface texture
 101.6,100-2

Surface texture symbols
 101.6.1,100-2

Symbology
 501.3,500-1

Symbology without established references
 501.3.2,500-1

Symmetrically opposite (mirrored) parts
 406.12.2,400-9

Symmetrically opposite parts
 3.82,23

System (general)
 3.83,24

T

Tabulation
 202.1,200-1

Tabulation requirements
 202.1.1,200-1

Tags and plates
 101.16.1.2,100-7

Tailoring, 28

Tailoring guidance
 6.2.2,27

Testing Laboratory
 30.5,D-1

Toxicological products
 40.6,C-3

Transferring design responsibility to another
 activity
 406.9,400-5

Transportability drawing
 204.2.9,200-10

Tube bend drawings
 204.1,200-3

Type designators

301.2,300-1

Types of engineering drawings

200-1

U

Undimensioned drawing

204.1,200-3

Unit

3.84,24

Unspecified characteristics.

40.11,C-6

Use of Government and non-Government
standardization documents

101.23,100-12

Use of shall, will, should and may.

101.18.3,100-8, 63

V

Vendor

3.85,24

Vendor item control and source control

notations

406.11.1,400-8

Vendor item control drawings

204.1,200-2

W

Welding symbols

101.12.10,100-3

Wiring harness drawing

204.1,200-3

Wiring list

204.1,200-3

CONCLUDING MATERIAL

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