QUALITY ASSURANCE PROVISIONS (QAP)

(PRODUCT ASSURANCE PAM 702-155)

1. COMMAND AGENCY: **U. S. ARMY TANK AUTOMOTIVE RESEARCH, DEVELOPMENT & ENGINEERING CENTER, WARREN, MI 48397-5000**

2. THESE QAPS FORM PART OF DRAWING / SPECIFICATION **10898035** AS SPECIFIED IN THE CONTRACT. INSPECTION SHALL BE CONDUCTED AS SPECIFIED HEREIN AND IN ACCORDANCE WITH REFERENCED DOCUMENTS. THIS INCLUDES GENERAL QUALITY ASSURANCE PROVISIONS (STA FORM 458), WHICH FORMS A PART OF THIS QAP.

3.

PART I - LIST OF APPLICABLE DOCUMENTS

DRAWINGS

10918611	RADIOGRAPHIC POSITION CHART (COVER, FINAL DRIVE)
12369003	PAINT SYSTEMS FOR STEELS, EXTERIOR SURFACES, GREEN 383
12369004	PAINT SYSTEMS FOR STEELS, INTERIOR SURFACES, WHITE

STANDARDS

ASTM E94	STANDARD GUIDE FOR RADIOGRAPHIC EXAMINATION
MIL-STD-130	IDENTIFICATION MARKING OF US MILITARY PROPERTY
ASTM A148	STEEL CASTINGS, HIGH STRENGTH, FOR STRUCTURAL PURPOSES
ASTM E446	REFERENCE RADIOGRAPHS FOR STEEL CASTINGS UP TO 2 IN. IN THICKNESS

SPECIFICATIONS NONE

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REVISIONS

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8. QAP FOR: **COVER, FINAL DRIVE**	**M109/A1B/A2/A5P**	9. CODE **19207**	
10. SUBMITTED BY: **BARNES & REINECKE, INC.**		11. QAP NO. **10898035**	
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STA FORM 456 1 FEB 83 PREVIOUS EDITIONS ARE OBSOLETE

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PART II - INSPECTION REQUIREMENTS

TABLE I - CLASSIFICATION OF QUALITY CONFORMANCE CHARACTERISTICS

CLASS	CHARACTERISTIC	INSPECTION METHOD
CRITICAL	NONE	
MAJOR	AQL 1.0% DEFECTIVE	
101	MARKED DIAMETERS (*) CONCENTRIC, PARALLEL AND SQUARE TO EACH OTHER AND TO SURFACES MARKED "Y" AND "W" (AS APPLICABLE) WITHIN .002	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR CMM
102	LOCATION OF .984 DIAMETER (3) HOLES	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
103	LOCATION OF .812 DIAMETER (14) HOLES	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
104	LOCATION OF 9/16 DIAMETER (7) HOLES	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
105	3/8 NPTF PIPE THREAD (2 PLACES)	PIPE THREAD GAGE
106	LOCATION OF 1/2-20UNF-2B (4) HOLES	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
107	LOCATION OF 3/8-24UNF-2B (12) HOLES	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
108	LOCATION OF 1/4-28UNF-2B HOLE	DIAL INDICATOR WITH STAND, SURFACE PLATE, OR DRILL FIXTURE, OR CMM
109	PAINT APPLICATION - COVERAGE - COLOR THICKNESS - WORKMANSHIP (DWGS. 12369003 AND 12369004)	VISUAL AND THICKNESS GAGE

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PART II - INSPECTION REQUIREMENTS (CONTINUED)

TABLE I - CLASSIFICATION OF QUALITY CONFORMANCE CHARACTERISTICS (CONTINUED)

CLASS	CHARACTERISTIC	INSPECTION METHOD
MINOR	AQL 2.5% DEFECTIVE	
201	3/8-24UNF-2B THREAD (12) HOLES AT I" DEEP	GO THREAD PLUG GAGE NO GO THREAD PLUG GAGE
202	1/4-28UNF-2B THREAD HOLE AT 3/8" DEEP	GO THREAD PLUG GAGE NO GO THREAD PLUG GAGE
203	1/2-20UNF-2B THREAD (4) HOLES	GO THREAD PLUG GAGE NO GO THREAD PLUG GAGE
204	.984 Ø (3) HOLES	GO PLUG GAGE NO GO PLUG GAGE
205	9/16 Ø (7) HOLES	GO PLUG GAGE NO GO PLUG GAGE
206	.812 Ø (14) HOLES	GO PLUG GAGE NO GO PLUG GAGE
207	5.078 Ø BORE	DIAL BORE GAGE
208	1.380 DIMENSION	LENGTH GAGE
209	.067 Ø HOLE AT .250 DEEP	GO PLUG GAGE NO GO PLUG GAGE
210	7.843 Ø BORE	DIAL BORE GAGE
211	.708 DIMENSION	WIDTH GAGE
212	4.219 Ø BORE	DIAL BORE GAGE
213	SURFACE TEXTURE "125" (11 PLACES)	COMPARATOR BLOCKS
214	PART NUMBER APPLICATION	VISUAL
215	INDICATED CASTING SURFACE FLUSH AS REQUIRED	VISUAL

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PART II - INSPECTION REQUIREMENTS (CONTINUED)

TABLE I - CLASSIFICATION OF QUALITY CONFORMANCE CHARACTERISTICS (CONTINUED)

CLASS	CHARACTERISTIC	INSPECTION METHOD
MINOR		
215	NO PRIMER OR PAINT ON MACHINED SURFACES AND TAPPED HOLES	VISUAL
216	WORKMANSHIP	VISUAL AND TACTILE

TABLE II - SPECIAL SAMPLING INSPECTION

1. **PREPRODUCTION INSPECTION (CASTING MATERIAL).** PRIOR TO INITIAL PRODUCTION APPROVAL, SAMPLE CASTING(S) THAT REPRESENT THE METHOD OF MOLDING, GATING, RISERING, POURING, AND HEAT TREATMENT TO BE USED FOR PRODUCTION CASTINGS SHALL BE SUBJECTED TO EXAMINATION AND TESTS BY THE CONTRACTOR. PREPRODUCTION INSPECTION SHALL INCLUDE VISUAL EXAMINATION, MEASUREMENT FOR DIMENSIONS AND TOLERANCES, TENSION TESTS FOR MECHANICAL PROPERTIES, CHEMICAL ANALYSIS, AND NON-DESTRUCTIVE TESTS FOR SOUNDNESS TO DETERMINE CONFORMANCE TO ALL REQUIREMENTS OF OF DRAWING 10898035 AND SPECIFICATION ASTM A148. NONDESTRUCTIVE TESTS FOR SOUNDNESS SHALL BE BY RADIOGRAPHIC INSPECTION AS SPECIFIED IN PART IV, PARA. 1.

1.1 **MANUFACTURING PROCESS CHANGE**. WHENEVER A CHANGE IS MADE IN THE MANUFACTURING PROCEDURE USED IN PRODUCTION, WHICH MAY AFFECT FIT, FUNCTION, OR SERVICE LIFE OF THE ITEM, THE GOVERNMENT REPRESENTATIVE WILL BE NOTIFIED PRIOR TO THE CHANGE AND ONE OF THE FIRST FIRST ITEMS PRODUCED UNDER THE NEW PROCESS SHALL BE GIVEN A COMPLETE INSPECTION AS SPECIFIED IN PARAGRAPH 1.

1.2 **FAILURE**. FAILURE OF THE PREPRODUCTION SAMPLE TO MEET THE SPECIFIED REQUIREMENTS SHALL BE CAUSE FOR REJECTION. THE CONTRACTOR SHALL PROVIDE OBJECTIVE EVIDENCE TO THE GOVERNMENT WITHIN 20 DAYS AFTER FAILURE, OF EFFECTIVE CORRECTIVE ACTION TAKEN IN PREVENTING RECURRENCE OF FAILURES AND PARAGRAPH 1 SHALL APPLY UNTIL ACCEPTABLE ITEMS ARE PRODUCED.

2. **INITIAL PRODUCTION INSPECTION**. ONE (1) OF THE FIRST ITEMS PRODUCED SHALL BE SELECTED AT RANDOM AND SUBJECTED TO EXAMINATIONS AND TESTS BY THE CONTRACTOR. THE ITEM SHALL BE PRODUCED UNDER MANUFACTURING METHODS TO BE USED IN PRODUCTION. INITIAL PRODUCTION INSPECTION SHALL BE ACCOMPLISHED TO DETERMINE CONFORMANCE TO ALL REQUIREMENTS OF DRAWING 10898035.

1.1 **MANUFACTURING PROCESS CHANGE**. WHENEVER A CHANGE IS MADE IN THE MANUFACTURING PROCEDURE USED IN PRODUCTION, ONE (1) OF THE FIRST ITEMS PRODUCED UNDER THE NEW PROCESS SHALL BE GIVEN A COMPLETE INSPECTION AS SPECIFIED IN PARAGRAPH 2.

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PART II - INSPECTION REQUIREMENTS (CONTINUED)

TABLE II - SPECIAL SAMPLING INSPECTION (CONTINUED)

1.2 **FAILURE**. FAILURE OF THE ITEM TO MEET INITIAL PRODUCTION APPROVAL REQUIREMENTS SHALL BE CAUSE FOR REJECTION AND PARAGRAPH 2 SHALL APPLY UNTIL ACCEPTABLE ITEMS ARE PRODUCED.

3. **PRODUCTION QUALITY CONTROL (CASTING MATERIAL)**. THE CONTRACTOR SHALL SELECT CASTINGS AT RANDOM AT THE RATE OF ONE (1) OF EACH TWENTY-FIVE CASTINGS PRODUCED. THE SELECTED CASTINGS SHALL BE IDENTIFIED AS TO PRODUCTION PERIOD AND SUBJECTED TO THE FOLLOWING RADIOGRAPHIC INSPECTION:

NUMBER	CHARACTERISTIC	INSPECTION METHOD
301	CASTING DEFECTS COMPARED TO ESTABLISHED STANDARDS (ASTM E446 AND ASTM E94)	VISUAL (REF. PART IV, PARA. 1)

3.1 **FAILURE**. FAILURE OF ANY ONE (1) TEST SAMPLE SHALL BE CAUSE FOR REJECTION OF THE ENTIRE REPRESENTATIVE PRODUCTION LOT. ITEMS PRODUCED SUBSEQUENT TO FAILURE OF A TEST SAMPLE SHALL NOT BE SUBMITTED FOR ACCEPTANCE UNTIL OBJECTIVE EVIDENCE HAS BEEN SUBMITTED TO THE GOVERNMENT THAT CORRECTIVE ACTION HAS ELIMINATED THE CAUSE OF THE FAILURE. ACCEPTANCE OF PRODUCTION LOTS SUBSEQUENT TO TEST FAILURE SHALL NOT RESUME UNTIL THREE (3) CONSECUTIVELY PRODUCED SAMPLES SUCCESSFULLY MEET TEST REQUIREMENTS SPECIFIED IN PARAGRAPH 3.

PART III - CERTIFICATION REQUIREMENTS

NUMBER	CHARACTERISTIC	CERTIFICATION METHOD
401	MATERIAL (ASTM A148) - CHEMICAL SOUNDNESS - SOUNDNESS REQUIREMENTS	CERTIFIED MATERIAL REPORT
402	CONTRACTOR'S RADIOGRAPHIC INSPECTOR	CERTIFIED RADIOGRAPHIC INSPECTOR
403	CLEANING AND PRETREATMENT (DWG. 12369003 AND 12369004)	CERTIFIED PROCESS REPORT
404	PRIMER AND PAINT (DWG. 12369003 AND 12369004)	CERTIFIED MATERIAL REPORT FROM APPROVED SUPPLIER
405	PRIMING AND PAINTING (DWG. 12369003 AND 12369004)	CERTIFIED PROCESS REPORT

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PART IV - TEST METHODS AND PROCEDURES

1. **RADIOGRAPHIC INSPECTION.** RADIOGRAPHIC INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH THE METHODS PRESCRIBED BY ASTM E94 AND DRAWING 10918611. THE INSPECTION SHALL DETERMINE CONFORMITY OF THE CASTING TO THE SOUNDNESS REQUIREMENTS OF THE DRAWING 10898035 AND SPECIFICATION ASTM A148, USING REFERENCE RADIOGRAPHS OF ASTM E446.