

MILITARY SPECIFICATION

TIRE: PNEUMATIC; WITH FLAP, 14.00-20, RUN FLAT

1. SCOPE

1.1 This specification covers a run flat combat tire w/flap (see 6.4) for use where high mobility and speed are required for operations over varied types of terrain.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

Federal

- ZZ-I-550 - Inner Tube, Pneumatic Tire.
- ZZ-V-25 - Valves and Valve Spuds, Caps, and Cores, Pneumatic Tire.
- CCC-C-419 - Cloth, Cotton, Duck, Unbleached, Plied-Yarns, (Army and Numbered).
- CCC-C-428 - Cloth, Cotton, Duck; Fire, Water, Weather, and Mildew Resistant.

Military

- MIL-T-4 - Tire, Pneumatic, and Inner Tube, Pneumatic Tire: Tire with Flap; Packaging and Packing of.
- MIL-C-62090 - Car, Armored: Light, 4x4, XM706 and XM706E1.

STANDARDS

Federal

- FED. TEST METHOD STD. NO. 601 - Rubber: Sampling and Testing.

Military

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

FSC-2610

MIL-STD-1224 - Visual Inspection Guide for Pneumatic Tires
(Non-Aircraft).

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications.

2.2.1 The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society For Testing and Materials
ASTM Method D746

(Application for copies should be addressed to the American Society For Testing and Materials, 1916 Race Street, Philadelphia 3, Pa. 19103.)

3. REQUIREMENTS

3.1 Preproduction sample. When specified (see 6.2), a preproduction sample(s) shall consist of 5 tires and 5 flaps. Tires and flaps furnished under this specification shall be products which have been represented by samples which have been subjected to inspection and have passed the preproduction inspection specified herein. When specified (see 6.2), a road service test shall be conducted, and additional 5 tires and flaps shall be furnished.

3.2 Materials. Unless otherwise specified (see 6.2), material used in the manufacture of the tire assembly herein described shall be new and of a quality suitable for this type of equipment, considering strength, durability, ductility, best engineering practice, and the purpose for which the equipment is to be used.

3.3 Performance. The 14.00-20, rated 12-ply directional aggressive tread tires furnished and mounted on the XM706 series conforming to specification MIL-C-62090, shall be of the run flat, combat type. At zero (0) gage pressure, the tire shall be capable of continuing operation for a minimum of 25 miles on a concrete road surface at not more than 35 mph. The tire shall have a load carrying capability of 6500 pounds at 50 psi and minimum tread depth shall be 0.80 inches.

3.3.1 Environmental. Tires shall have the inherent capability of acceptable performance in ambient temperatures from plus 125°F to minus 65°F. Tires shall be free from cracks, breaks, separations, fissures, craze, and ruptures. Tires shall withstand storage without deterioration for a minimum of 5 years in ambient temperatures from plus 125°F to minus 65°F.

3.3.2 Tire maintenance. Tire assemblies shall require only organizational maintenance (tire repair due to puncture) during 5,000 miles of operation.

3.3.3 Terrain. To assure the workmanship and reliability requirements are met during 5,000 miles of operation, the XM706 combat loaded to 16,250 pounds gross vehicle weight (GVW) and equipped with the tire assembly shall be capable of operating as follows:

- a. Hard surface roads - 30 percent, (1,500 miles)
- b. Gravel and dirt roads - 65 percent, (3,250 miles)
- c. Level cross-country - 2.5 percent, (125 miles)
- d. Hilly cross-country - 2.5 percent, (125 miles)

3.3.4 Breaking energy. The minimum breaking energy value of the tires shall be specified in table I.

Table I. Military tires: Breaking energy values

Tire size	Ply rating	Class tread	Measuring rim	Inflation pressure (psi)	Breaking-energy value, minimum (inch-pounds)
14.00-20	12	Directional Aggressive	10.0	50	15,000

3.3.5 Tensile strength. The tire tread shall have a tensile strength of not less than 1,700 psi, and the sidewalls not less than 1,300 psi. Tensile stress at 300% elongation shall be determined.

3.3.6 Ultimate elongation. The tire treads and sidewalls shall have an ultimate elongation of not less than 400 percent.

3.3.7 Ozone resistance. All tires shall meet dynamic and static resistant requirements and tire flaps shall be static ozone resistant to the extent specified herein (see Table III).

3.3.8 Indoor endurance. The tires shall show no evidence of broken cords, separation of tread, ply, cord, bead, and cracking in the tread and sidewalls sufficient to expose the fabric. The tires shall be examined for compliance with dimensions specified herein (see Table III).

3.3.9 Balance limits. The tires shall meet static unbalance of 345 oz-in.

3.3.10 Road service. The tires shall show no evidence of broken cords,

separation of tread, ply, cord, bead, and cracking in the tread and sidewalls sufficient to expose the fabric. There shall be no fabric visible as a result of tread wear.

3.3.10.1 Gradeability. The complete vehicle carrying a selected or simulated combat load, not exceeding 16,250 pounds, shall perform as specified herein. The complete vehicle shall operate on longitudinal slopes up to 50 percent and side slopes up to 30 percent. The vehicle combat loaded or with simulated load of equal weight shall perform as specified herein with tire pressures as follows:

- | | |
|---|--------|
| a. Highway (hard surface) | 45 psi |
| b. Cross-country, gravel and dirt roads | 30 psi |
| c. Sand, snow and deep mud | 10 psi |

3.4 Design and construction. At the time the preproduction sample is submitted for inspection, the supplier shall establish an average weight for the tire, applicable to each of the manufacturing facilities where such tires are proposed to be built. The maximum variation from the established average shall not exceed plus or minus 4 percent for the tire; tires for which a maximum weight is established shall not vary over the maximum weight of 295 pounds for the tire and 5.5 pounds for the flap.

3.4.1 Tread. The tread design shall be of a directional aggressive design.

3.4.1.1 Undertread thickness. Under tread thickness shall be not less than 0.20 inches.

3.4.2 Dimensions. Tires shall be of the dimensions specified in figure 4.

3.4.3 Sidewall. The sidewall cover shall be designed to protect the carcass against moisture, weathering, abrasion or other injury. The shoulder location on tires shall be defined as the point of maximum flat-plate foot print when the tire is deflected at the rated load and inflation in an ambient air temperature of from 70° to 90°F.

3.4.4 Bead construction. The beads shall be of such construction as to anchor the tire firmly to the rim without slippage under operating conditions.

3.4.5 Tire flaps. A flap of the correct size shall be furnished with each tire. The flap shall be of the endless type, and of such width and form as to fit the tire without buckling or wrinkling. Flap size shall be as follows:

<u>Tire Sizes</u>	<u>Flap code (see 6.4)</u>	<u>Minimum flap width</u>
14.00-20	20-V	8 1/4 inches

3.4.6 Inner tube and wheel adaptation. The tire shall be of a form adapted to inclose an inner tube, size 14.00-20, containing air under pressure and fit on a wheel with a rim diameter of 20 inches and a rim width of 10 inches.

3.4.7 Quality levels. All tires shall be of a quality recognized in the trade as 100 level, and shall be of no lower quality than tires normally furnished in representative quantities by original equipment tire manufacturers as standard original equipment for passenger cars, trucks, or other ground vehicles.

3.5 Tire and tire flap marking. The manufacturer's name or trademark, the nominal tire size (including number of plies or ply rating) shall be molded or branded on each side of each tire. The tires shall be identified in accordance with Federal D.O.T Regulations. Each tire flap shall be permanently and legibly marked with the manufacturer's name or trademark and the proper flap code (see 6.4). In addition, tires and flaps shall be identified in a permanent manner as specified herein.

3.5.1 Marking. To signify ozone resistance, all tires shall be identified by a symbol consisting of the capital letters "OZ", not less than 1/2 inch high, marked on the serial number side near the serial number.

3.5.1.1 Tire flaps. To signify ozone resistance, all tire flaps shall be identified by a symbol consisting of the capital letters "OZ", not less than 1/2 inch high marked on each flap.

3.5.2 Design type. To identify their special construction, all tires shall be permanently marked with the word "MILITARY", in capital letters 1/2 inch high. These letters shall be depressed into or embossed on the sidewall on the serial number side, under or near the size marking.

3.5.3 Balance. All tires shall be marked on the serial number side with a red mark not less than 1/4 inch in size, to indicate the lightweight point of the tire.

3.5.4 Complete marking. Marking shall be complete, conforming to the requirements specified herein. Marking may be restored or added with impressed or raised characters, which approximate the same size as those produced by the mold. Marking shall be in accordance with Federal D.O.T. Regulations.

3.6 Workmanship. Workmanship shall be such that the tires are free from defects which may impair the serviceability of tires are detailed hereinafter,

together with their specific limits, and measures to be taken for correction, when permissible. Photographic examples of defects in new tires are shown in MIL-STD-1224.

3.7 Engineering evaluation sample. Simultaneously with the selection of the control test sample (see 4.4.1), one tire and flap shall be furnished to the Government for engineering evaluation purposes. Unless otherwise specified (see 6.2), this sample shall be forwarded to Commanding General, Headquarters, U. S. Army Tank-Automotive Command, Warren, Michigan 48090, ATTN: AMSTA-RKMT.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Parts and components. Parts, components and assemblies shall be inspected in accordance with the applicable specifications and drawings.

4.1.2 Contractor's quality control system. Unless otherwise specified by the procuring activity, the contractor shall provide and maintain an effective inspection or Quality Control System acceptable to the Government covering the supplies under the contract. A current written description of the system shall be submitted to the contracting officer prior to initiation of production. The contractor will not be restricted to the inspection station or to the method of inspection listed provided that an equivalent control is included in the approved quality control procedure. The contractor shall notify the Government of and obtain approval for any change to the written procedure that might affect the degree of control required by this specification or other applicable documents referenced therein.

4.1.3 Government verification. All quality assurance operations performed by the contractor will be subject to Government verification at unscheduled intervals. Verification will consist of - surveillance of the operations to determine that practices, methods, and procedures of the written inspection plan are being properly applied. Deviation from the prescribed or agreed upon procedures, or instances of poor practices which might have an effect upon the quality of the product will immediately be called to the attention of the contractor. Failure of the contractor to promptly correct deficiencies discovered shall be cause for suspension of acceptance until corrective action has been made or until conformance of product to prescribed criteria has been demonstrated.

4.1.4 Materials. The contractor shall provide the Government with evidence that materials (see 3.2) used are as specified in the applicable specifications and drawings.

4.2 Preproduction sample. The preproduction sample (see 3.1) shall be furnished by the contractor for preproduction inspection. This sample shall be representative of the product proposed to be furnished under the contract. Inspection shall be conducted by the Government at a place designated by the Government. The preproduction sample shall be examined for the defects listed in Table II, and subjected to all tests as shown in Table III for preproduction. No changes shall be made in material or design after preproduction testing except as specifically approved by the procuring activity.

4.3 Quality conformance inspection.

4.3.1 Sampling.

4.3.1.1 Lot formation. Unless otherwise specified (see 6.2), a lot shall consist of tires from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.3.1.2 Sampling for quality conformance examination. Samples for quality conformance examination shall be selected in accordance with inspection level II of MIL-STD-105.

4.3.1.3 Sampling for quality conformance testing. Samples for quality conformance testing shall be selected in accordance with inspection level S-3 of MIL-STD-105.

4.3.2 Examination inspection.

4.3.2.1 Acceptable quality level. The external and internal surfaces of each sample selected as specified herein shall be examined for conformance to the following acceptable quality levels (AQL), on the basis of percent defective:

<u>Classification</u>	<u>AQL</u>
Major	4.0
Minor	6.5

4.3.2.2 Classification of defects. For examination purposes, defects shall be classified as specified in Table II.

Table II. Classifications of defects

Categories	Defects	Method of Inspection
Critical	None defined	
Major	AQL 2.5 percent	
101	Cord buckles: (see 3.6.1)	Visual
102	Insufficient ply coating: (see 3.6.2)	Visual
103	Bead Kink: due to improper mounting, dismounting or removal from curing mold: bulge 1/16 inch or more in height (see 3.6.3)	Gage
104	Sidewall cracks: 1/2 or more of sidewall thickness in depth (see 3.6.4)	Scale and gage
105	Cut or damaged cords: extending beyond four adjacent cords (see 3.6.5)	Visual
106	Ply separation: 3/4 inch or more in longest dimension (see 3.6.6)	Scale
107	Tread folds: if greater than 3 inches long, one half the skid depth, or one half element width (see 3.16.7)	Scale
108	Mold folds: to or below cords (see 3.6.8)	Visual
109	Tread craters: over 3 inches long, one half nonskid depth or one half the element width (see 3.6.9)	Scale
110	Tread edges: with radii over one half of skid depth or extending over 60 degrees around tire circumference (see 3.6.10)	Gage
111	Open tread splice: due to improper fusing of splice ends, over 1 inch long or deeper than 15 percent of skid depth or with a depression under splice area (see 3.6.11)	Scale and template
112	Open sidewall splice: due to improper fusing of splice end, more than one splice per tire, splice depth over one half sidewall thickness or with depression under splice (see 3.6.12)	Scale and template
113	Sidewall light or thin areas: if over 3 square inches in area or deeper than one half sidewall cover thickness (see 3.6.13)	Scale

Table II. Classifications of defects (cont'd)

Categories	Defects	Method of Inspection
114	Sidewall blisters: more than 1 square inch in area (see 3.6.14)	Scale
115	Narrow beads: 11 percent or more under-size (see 3.6.17)	Gage
116	Spread cord inside: cords loose, cords in ply below visible, arc of injury greater than 30 degrees, area cord count reduced over 12 percent or distance between any two adjacent cords exceeds 0.063 inch (see 3.6.20)	Scale
117	Loose cords or splices: due to defect in construction and occurring more than once in 10 inches measured around the tire center-line under the tread (see 3.6.21)	Scale
118	Tread-element rounding: occurring during molding, edges rounded over 1/16 inch vertically, with radius more than one half skid depth and arc covered is more than 30 degrees (see 3.6.23)	Template
119	Tread-element edges: occurring during molding, total circumferential injury covers an arc greater than 30 degrees and injuries not due to lack of molding pressure (see 3.6.24)	Template
120	Tread pock marks: due to uneven flow of stock during molding, injury depth exceeding 0.03 inch (see 3.6.25)	Scale
121	Tread blows: injury greater than 3/4 inch in largest dimension (see 3.6.26)	Scale
122	Sidewall craters: injury greater than 1/4 inch in area and deeper than 0.03 inch (see 3.6.27)	Scale
123	Sharp edges and airbag roughness: injury greater than 0.020 inch (see 3.6.28)	Scale
124	Foreign material: cured into inside or outside of tire, injury not repairable (see 3.6.29)	Visual
125	Wavy cords: spread over large area (see 3.6.30)	Visual
126	Mold tearing: injury one third or more of rib or row (see 3.6.32)	Scale
127	Oxidized liner stock: (see 3.6.33)	Visual

Table II. Classifications of defects (cont'd)

Categories	Defects	Method of Inspection
128	Exposed fabric: in tubeless tire due to error in building (see 3.6.34)	Visual
129	Liner splice opening: (see 3.6.35)	Visual
130	Off-register treads: treads diametrically off-register, more than 1/8 inch; mold halves in misalignment by more than 1/4 inch: (see 3.6.36)	Scale
131	Tread flash: at mold register greater than 3/16 inch (see 3.6.37)	Scale
132	Weight of tire: (see 3.4 and 3.4.7)	Scale
Minor	AQL 4.0 percent	
201	Tire flaps: flap type, size, if properly fits tire without buckling and wrinkling (see 3.4.5)	Visual
202	Complete marking: improper, incomplete, and proper location (see 3.5.5)	Visual
203	Bead kink: bulge less than 1/16 inch in height (see 3.6.3)	Gage
204	Sidewall cracks: depth less than one half of sidewall thickness (see 3.6.4)	Scale
205	Cut or damaged cords: extending less than four adjacent cords (see 3.6.5)	Visual
206	Ply separation: less than 3/4 inch in longest dimension (see 3.6.6)	Scale
207	Tread folds: less than 3 inches long and less than one half the skid depth, and less than one half element width (see 3.6.7)	Scale
208	Mold folds: of less than cord depth (see 3.6.8)	Visual
209	Tread craters: less than 3 inches long, and less than one half the nonskid depth, and less than one half the element width (see 3.6.9)	Scale
210	Tread edges: with radii less than one half the skid depth, and extending less than 60 degrees around tire circumference (see 3.6.10)	Scale
211	Open tread splice: due to improper fusing of splice ends, one inch or less in length, and	Scale

Table II. Classifications of defects (cont'd)

Categories	Defects	Method of Inspection
	15 percent or less of skid depth, and with no depression under splice area (see 3.6.11)	
212	Open sidewall splice: due to improper fusing of splice ends, only one splice per tire, and splice depth one half or less of sidewall thickness, and with no depression under splice (see 3.6.12)	Scale
213	Sidewall light or thin areas: 3 square inches or less in area, and one half or less of sidewall cover thickness in depth (see 3.6.13)	Scale
214	Sidewall blisters 1 square inch or less in in area (see 3.6.13)	Scale
215	Sidewall blemishes: due to nonfill of material or to excessive buffing (see 3.6.15)	Visual
216	Wide beads: (see 3.6.16)	
217	Narrow beads: 10 percent or less undersize (see 3.6.17)	Scale
218	Bead roughness: (see 3.6.18)	Scale
219	Bead fabric: loose or torn (see 3.6.19)	Visual
220	Spread cords inside: no loose cords, and no cords visible in ply below, and arc of injury is 30 degrees or less, and area cord count is reduced 12 percent or less (see 3.6.20)	Scale
221	Loose cords or splices: occurring only once in 10 inches measured around the tire centerline under the tread (see 3.6.21)	Scale
222	Shallow or thin spots inside: due to defect in tire construction (see 3.6.22)	Visual
223	Tread-element rounding: tread edges rounded 1/16 inch or less vertically, and with radius one half or less of skid depth, and arc covered is 30 degrees or less (see 3.6.23)	Scale and template
224	Tread-element edges: slightly damaged but total circumferential injury covers an arc of 30 degrees or less and injury is not due to lack of molding pressure (see 3.6.24)	Scale
225	Tread pock marks: 0.03 inch or less in depth (see 3.6.25)	Gage

Table III. Classifications of defects (cont'd)

Categories	Defects	Method of Inspection
226	Tread blows: $3/4$ inch or smaller in largest dimension (see 3.6.26)	Scale
227	Sidewall craters: $1/4$ square inch and smaller in area, and 0.03 inch or less in depth (see 3.6.27)	Scale and gage
228	Airbag roughness: 0.020 inch or less depth (see 3.6.28)	Scale and gage
229	Foreign material: cured into inside or outside of tire: if repairable (see 3.6.29)	Visual
230	Wavy cords: if localized (see 3.6.30)	Visual
231	Loose tuck-under (see 3.6.31)	Visual
232	Mold tearing: less than one third of rib or row (see 3.6.32)	Scale
233	Off-register treads: treads diametrically off-register $1/8$ inch or less or mold halves in misalignment, $1/4$ or less (see 3.6.36)	Scale
234	Tread flash: at mold register equal to or less than $3/16$ inch (see 3.6.37)	Scale

4.3.3 Testing. Samples selected in accordance with 4.3.1.3 shall be subjected to the test specified in Table III using an AQL of 4 percent on the basis of percent defective.

Table III. Applicable tests

Test specimen	Requirement paragraphs	Test paragraphs	Name of test	Preproduction	Acceptance	Control
Specimen No. 1						
Tire	3.3.11	4.5.1	Balance limits	X	X	
	3.4.1.1, 3.4.2 & 3.4.3	4.5.2 thru 4.5.2.4.4	Dimensional check (except thickness)	X		X
	3.3.5	4.5.3, 4.5.3.1 & 4.5.3.2	Breaking energy and hidden defects	X		X
	3.3.6 & 3.3.7	4.5.4, 4.5.4.1 & 4.5.3.2	Tensile strength and elongation	X		X
	3.3.8	4.5.5.1 thru 4.5.5.1.5	Dynamo ozone	X		X
	3.3.8	4.5.5.2 thru 4.5.5.2.5	Static ozone	X		X
Specimen No. 2 and 3	3.3.9	4.5.6 thru 4.5.6.2.1	Indoor endurance	X		X
Specimen No. 4			Whole tire static ozone test	X		
Specimen No. 5	3.3.1	4.5.7	Indoor endurance at low temperature	X		
Specimen No. 6 thru 10 Five Tires	3.1, 3.3.3, 3.3.10 & 3.3.10.1	4.5.8 thru 4.5.8.4	Road service (when tested as singles)	X*		

Table III. Applicable tests (cont'd)

Test specimen	Requirement paragraphs	Test paragraphs	Name of test	Preproduction	Acceptance	Control
Specimen No. 1 thru 5 Tire flap	3.3.8	4.5.5.3	Tire flap ozone test	X		X

*To be run on preproduction only when so specified in the contract.

4.4 Control tests.

4.4.1 Control test sample. The control test sample shall consist of three tires and, one tire flap. Samples shall be selected at the following rates:

<u>Calendar-year production</u> (per plant)	<u>Control test</u> (per calendar year)
1-2500	1 sample
2501-5000	1 additional sample
5001 and up	1 additional sample for each 5000 but not more than 1 sample per month

Results of control tests shall be forwarded to Commanding General, U. S. Army Tank-Automotive Command, Warren, Michigan 48090, ATTN: AMSTA-RKMT and AMSTA-QST.

4.4.2 Applicable tests. Unless otherwise specified in the contract or purchase order, tires and flaps selected as specified herein shall be tested by the supplier. Control test samples shall be examined for the defects specified in Table II and subsequently subjected to the applicable tests specified in Table III.

4.4.3 Failure. Failure of a control test tire or flap to pass any of the specified examination or tests shall result in the following at the option of the Government:

- (a) Retest of two additional tires or flaps and no acceptance made of the tires or flaps on hand at the manufacturer's plant until retest is completed.
- (b) Failure of retested tires or flaps shall result in refusal of the Government to authorize shipment of previously manufactured tires or flaps, either from untested or acceptance-tested lots, on hand at the manufacturer's plant.

- (c) That on all rejected tires and tire flaps, the contractor, at no additional cost to the Government, shall remove the word "MILITARY" and the symbol "OZ" from said rejected tires and tire flaps.

4.4.3.1 Procedure subsequent to failure of retested tires or flaps. When tires or flaps are rejected on the basis of failure of retested sample, production and acceptance of new tires or flaps can be resumed in accordance with the following provisions at the option of the Government:

- (a) Contractor shall submit to the Government satisfactory evidence that the deficient condition has been corrected.
- (b) The contractor shall then submit a control test sample representative of the corrected condition for test. Successful completion of test shall be required before acceptance of new production will be made by Government.

4.4.4 Sample inspection. Initial control test sample shall be taken at or near the start of production under each contract or order. Control testing shall be accomplished by the supplier.

4.5 Test procedures.

4.5.1 Balance limits. Tires shall be checked for balance to determine conformance to 3.3.11.

4.5.1.1 Corrective methods. Unbalance of tires beyond the limits specified in 3.3.11 may be corrected with balance paint, cement, or patch permanently affixed to the inside of the tire. The balance paint or cement shall not adhere to the inner tube. Any patches used shall not chafe the inner tube.

4.5.2 Dimension checks (see Figure 4).

4.5.2.1 Skid depth. The skid depth shall be determined by inspection of mold drawings, or by measuring actual molds.

4.5.2.2 Tread contours. Measurement of tread contour dimensions shall be made of a check tire from the mold when originally designed.

4.5.2.3 Unmounted tire.

4.5.2.3.1 Bead width. When applicable to controlled beads, and to determine conformance to 3.4.2, the bead width shall be measured and recorded.

4.5.2.4 Mounted tire. The tire specimens shall be mounted on the applicable rim specified in Figure 4, and inflated to the pressures referenced in Table

IV. The tire shall be allowed to stand for 24 hours at room temperature, and then shall be adjusted to specified pressure. With the tire thus prepared, the following measurements shall be made and the average recorded to determine conformance to 3.4.2.

Table IV. Military tires: conditions for indoor-endurance test

Tire size (in.)	Fly rating	Class tread	Inflation pressure psi.	Rim	Speed (mph)	Maximum rated load (lbs)	Test loads		Time of run (hrs)	Test miles minimum
							Percent of max rated load	Load (lbs)		
14.00-20	12	Directional Aggressive	50	10.0	30	6,390	70	4,470	7	1,410
							90	5,750	16	
							110	7,030	24	

4.5.2.4.1 Outside diameter. The outside circumference of the tire shall be measured to the nearest tenth of an inch and the result divided by 3.1416 to determine the diameter.

4.5.2.4.2 Tire width. The tire shall be calipered at six different points, spaced approximately equally around the circumference, and the average of these measurements determined. Each measurement shall be made at a point of maximum width of ribs, bars, or decorations.

4.5.2.4.3 Tire section. The tire shall be calipered at six different points, spaced approximately equally around the circumference, and the average of these measurements determined. Each measurement shall be taken over the normal sidewalls, and shall not include protective ribs, bars, or decorations.

4.5.2.4.4 Thickness. After the tire has been cut to determine hidden defects specified herein, the thickness of the sidewalls and undertread thickness shall be measured in accordance with method 2011, 2021, or 2121 of Standard FED. TEST METHOD STD. NO. 601 to determine conformance to 3.4.1.1 and 3.4.3.

4.5.3 Breaking energy and hidden defects.

4.5.3.1 Breaking energy plunger test procedure. After the tire is mounted and has been measured as specified herein, a cylindrical steel plunger, 1-1/4 inches in diameter and hemispherical at the working end, shall be forced into the center of the tread portion of the inflated tire at the rate of 2 inches per minute to determine the force and penetration at break. Five measurements of force and penetration at break shall be made at points equally spaced around the circumference of the tire. In the event that the tire fails to break before the

plunger is stopped by reaching the rim, the force and penetration shall be taken as this occurs. The energy value to determine conformance to 3.3.5 shall be calculated from the average values at break using the following formula:

$$W = \frac{F \times P}{2}$$

W = energy at break, inch pounds.

F = force at break, pounds.

P = penetration at break, inches.

4.5.3.2 Hidden defects. After the plunger test has been made, the tire shall be subjected to visual inspection for hidden defects. This shall be done by cutting the tire in ten radial sections, with each section being cut circumferentially, in midcrown and on each side of crown, near breaker edge at point of maximum shoulder thickness; any additional cuts deemed necessary for complete inspection of the tire shall be made. The cut sections shall then be inspected for evidence of separation of tread, ply, cord, or bead.

4.5.4 Tensile strength and elongation. After being checked for hidden defects, the tire shall be subjected to tests for tensile strength and ultimate elongation of tread and sidewall, to determine conformance to 3.3.6 and 3.3.7 respectively.

4.5.4.1 Preparation of test specimens. Test specimens shall be cut (longitudinally at center of tread or sidewall) with a die No. VII of method 4111 of Standard FED. TEST METHOD STD. NO. 601. On tread specimens, the nonskid portion shall be sliced off with a knife, after which the central portion shall be buffed on each side over a length of 2 1/2 inches until free from friction compound, fabric impressions, or irregularities of surface. In case specimens cut with die No. VII cannot be obtained, specimens may be cut with die No. IV of method 4111 of the same standard. On sidewall specimens, rubber solvent shall be used, if necessary, to separate rubber and fabric and one or both sides shall be buffed as necessary.

4.5.4.2 Procedure. The specimens, prepared as specified herein, shall be tested for tensile strength and ultimate elongation and tensile stress in accordance with methods 4111, 4121 and 4131 of FED. TEST METHOD STD. NO. 601.

4.5.5 Resistance to ozone dynamic test.

4.5.5.1 Tire, tread, and sidewall specimens. To determine conformance to 3.3.8, tires shall be those which have been checked for hidden defects. Test specimens shall be taken from both tread and sidewall of the tire. The test specimens and the Government control specimens shall be previously untested, shall be one inch in width or the maximum possible in tread bars less than one inch,

and as near to four inches in length as possible. The cut surfaces of the specimens shall be buffed to a thickness of 0.075 ± 0.005 inches. The specimens shall be cemented to the specimen belt, with the length of the specimen parallel to the length of the belt.

4.5.5.1.1 Tread specimen. The tire tread specimen shall be taken from the rib of tire (circumferential direction). The specimen shall not contain any discontinuous surfaces such as tread-shoulder intersections, curb rib protrusions, and ledges where the tread bar joins the sidewall.

4.5.5.1.2 Sidewall specimen. The sidewall specimen shall be taken from the sidewall of the tire in a circumferential direction. The specimens shall not contain any discontinuous surfaces such as raised or depressed mold markings.

4.5.5.1.3 Government control specimen. The Government control specimen shall be taken from test sheets compounded from the recipe (see 6.5) and cured 60 minutes at 287°F without mold lubricant. The control specimen shall be one by four inches. The mill grain of the control specimen shall be parallel to the four-inch length. The control specimen shall be buffed on one side to 0.075 ± 0.005 inch thick.

4.5.5.1.4 Apparatus. The testing apparatus, which shall include an ozone test chamber, shall conform in general to that shown in Figure 2. The source of ozone shall be a Hanovia No. 2851 Safe-T-Air lamp with quartz envelope, or equivalent. An exhaust blower of 60 cubic feet per minute capacity shall be installed at the top of the chamber. The blower shall be fitted with a damper to control the air flow, thus controlling the ozone concentration. The chamber shall be equipped with two $2\frac{1}{2}$ inch diameter pulleys, with the upper pulley powered to rotate at 350 revolutions per minute (rpm). The upper pulley shall have its shaft in a fixed position while the lower pulley shaft shall be allowed to move up or down in slots in the sides of the chamber. The lower pulley shaft shall have a 40 pound weight suspended from it to maintain sufficient tension on the specimen belt to achieve maximum flexing of the specimens around each pulley. The specimen belt, on which the specimens are cemented, shall be on No. 10, type I, treated cotton duck, class 2 finish, of Specification CCC-C-428, or of No. 10, type I cloth, cotton duck, unbleached plied yarns, of Specification CCC-C-419, or their equivalents, 4 inches, wide and 69 inches long. This size belt can accommodate up to 26 specimens. The speed of the belt in operation shall be approximately 40 rpm.

4.5.5.1.5 Procedure. Each group of specimens tested at one time and place shall include at least one Government control specimen (see 6.5). The belt, with the specimens cemented thereon, shall be installed on the pulleys in the chamber. Air with a relative humidity of 45 to 55 percent and at a temperature of $75^{\circ} \pm 5^{\circ}\text{F}$ shall be drawn into the chamber by operation of the blower. The damper on the blower shall be regulated so that the concentration of ozone in the chamber will remain at 30 ± 5 parts of ozone per 100,000,000 parts of air by volume.

The belt shall be put into operation and the specimens exposed to the mixture of ozone and air for 48 hours. During the 48-hour period, the specimens shall be observed periodically without magnification to determine conformance to 3.3.8. The observations shall be made after 24 and 48-hour exposure periods. If any cracking becomes evident in any of the test specimens during the test, it shall not show up in the specimen prior to, nor shall the degree of such cracking be greater than that of the Government control specimen.

4.5.5.2 Tire, tread, and sidewall specimens static ozone test. To determine conformance to 3.3.8, specimens shall be as described herein, except that specimens shall be of such length as to provide, as near as possible, three inches of exposed length (unstressed) between the clamps of the specimen holder (Figure 1).

4.5.5.2.1 Tread specimen. The tire tread specimen shall be as described herein.

4.5.5.2.2 Sidewall specimen. The sidewall specimen shall be as described herein.

4.5.5.2.3 Government control specimen. The Government control specimen shall be as described, except it shall be of such length as to provide, as near as possible, herein three inches of exposed length (unstressed) between the clamps of the specimen holder (see Figure 1).

4.5.5.2.4 Apparatus. The apparatus shall include an insulated test chamber, with an ozone generating source outside the chamber. Means shall be provided for measuring the ozone concentration, for controlling the temperature of the air in the chamber, and for circulating the air. The apparatus shall also include specimen holders as shown in Figure 1.

4.5.5.2.5 Procedure. Each group of specimens, tested at one time and place, shall include at least one Government control specimen (see 6.5). Bench marks 2 inches apart shall be placed on each specimen. The specimen, while straight but unstressed, shall be clamped in the holders with the clamps set as close to 3 inches apart as the length of the specimen will allow. The portion of the specimen between the bench marks shall be centered between the clamps. The specimens shall then be stressed by adjusting the clamps until the 2-inch space between the marks is elongated to 2 1/4 inches (12 1/2 percent). The stressed specimens, while elongated in the clamps, shall be conditioned at room temperature for 45 $\pm$ 5 minutes, and then exposed for 7 days in the test chamber in which air throughout the test, have an ozone concentration of 50 $\pm$ 5 parts of ozone per 100,000,000 parts of air by volume, is circulated at a temperature of 100° $\pm$ 5°F. If a specimen breaks at or near where clamped, it shall be reclamped and restressed to proper length. The surfaces of the portion of the specimens between the bench marks

shall be examined frequently on molded surface sides under 9 power magnification to determine conformance to 3.3.8. If any cracking becomes evident in any of the test specimens during the test, it shall not show up in the specimen prior to, nor shall the degree of such cracking be greater than that of the Government control specimen.

4.5.5.3 Tire flap ozone test. Test specimens shall be 1 inch in width and of such length as to provide 3 inches exposed length, unstressed, between the clamps of the specimen holder (Figure 1). Thickness of the specimen shall be 0.075 ± 0.005 inch, achieved by buffing material from the concave surface of the flap. Specimens shall be die cut from the flap with the long axis of the specimen parallel to the circumferential direction of the flap and at such location in cross section of the flap as will result in least curvature and most uniform thickness of the resulting test specimen. The Government control specimen shall be as specified herein. The specimens shall be subjected to the static ozone test procedure specified herein, to determine conformance to 3.3.8. If any cracking becomes evident in any of the test specimens during the test, it shall not show up in the specimen prior to, nor shall the degree of such cracking be greater than that of the Government control specimen.

4.5.6 Indoor endurance test. To determine conformance to 3.3.9, tires shall be mounted on rims as specified or on using rim and inflated as specified in Table IV.

4.5.6.1 Apparatus. The apparatus shall include a flat-faced steel wheel 67.23 inches in diameter (1/300 mile in circumference) and at least as wide as the cross section of the tire to be tested. During the test, the wheel and tire shall be located in an air space controlled at a temperature of $100^{\circ} \pm 5^{\circ}\text{F}$.

4.5.6.2 Procedure. The tire, mounted and inflated as required, shall be pressed against the test wheel with the initial test load specified in Table IV (see 6.3.1). Then with the ambient air held at a temperature of $100^{\circ} \pm 5^{\circ}\text{F}$, the tire shall be run at each of the test loads and for the time shown in the applicable table. At the end of each run, a record shall be made of the inflation pressure, with the first reading taken three hours after start of the test. In the event the pressure falls below the first value at later readings, it shall be brought up to the first value while the tire is a running temperature. At completion of the total test mileage shown in the table, the tires shall be cut as specified herein and examined for conformance to 3.3.9.

4.5.6.2.1 Procedure (modified). The tire shall be tested at lesser loads than shown in table IV, determined as follows: the test specimen shall be inflated to the rated pressure, then radially deflected against a flat plate the required distance to produce the maximum rated load. The test specimen shall then be loaded against the test wheel (or equivalent curvature) until the loading is sufficient to obtain the same radial deflection as obtained against the flat plate under specified load. The load against the curved surface shall represent the 100 percent test load of Table IV. A surface simulating the curvature of the test wheel may be used in lieu of the test wheel.

4.5.7 Low temperature brittleness test. Test samples shall be taken of the tire tread and sidewall from the locations specified herein. Size of samples and method of testing shall conform to American Society for Testing and Materials ASTM Method D746. Test samples shall be of the temperature specified in 3.3.1. Upon completion of test, the specimens shall be examined to determine conformance to 3.3.1.

4.5.8 Road-service test. The tires to be given the road-service test (see 3.1, 3.3.3, 3.3.10 and 3.3.10.1) shall be tested as specified herein. Should any of these tires fail during such testing because of cuts, punctures, or other accidental road hazards, it may be replaced with the fifth tire (see 3.1). The tire removed in this case shall not be considered as having failed. At the completion of the specified vehicle mileage (see Table V), each tire shall be cut and examined as specified herein to determine its conformance to 3.3.10.

4.5.8.1 Test failure. Failure of the tire assembly to comply with the requirements of this specification or any deficiency of a workmanship or materials nature found on the tire assembly during or as a result of the 5,000 miles test (see Table V) shall be cause for rejection of the tire assembly. Further, the Government may refuse to continue acceptance of production tire assembly until evidence has been provided by the manufacturer that corrective action has been taken to eliminate the deficiency. Any departure from the requirements of this specification found during or as a result of the 5,000 mile test shall be prima facie evidence that all tires already accepted prior to completion of the 5,000 mile test are similarly deficient unless evidence satisfactory to the contracting officer is furnished by the contractor that they are not similarly deficient. Such deficiencies on all tires shall be corrected by the contractor at no additional cost to the Government.

Table V. Proving ground test
 5,000 Mile Test (combat loaded)
 (Government Proving Grounds)

Course	Tire Pressure	Mileage, speeds *1
Hard surface roads	45 psi	1,500 miles at varying speeds up to 55 mph maximum
Gravel and dirt roads	30 psi	3,250 miles at varying speeds up to 30 mph maximum
Level cross-country	30 psi	125 miles at varying speeds up to 15 mph maximum
Hilly cross-country	30 psi	125 miles at varying speeds up to 25 mph maximum

NOTE: *1 - The vehicle shall be operated at a safe speed during the mileage shown.

4.5.8.2 Mounting positions. During the road-service test, the tires shall be mounted as follows:

Size 14.00-20: to be applied in single manner on front and rear wheels, and rotated daily in Figure-8 fashion.

4.5.8.3 Loads and pressures. The tires shall be tested in accordance with Table VI with tires loaded and inflated as shown therein.

Table VI. Vehicle payloads, tire loads, and inflation pressure for road-service test

Tire Size	Ply Rating	Gross Vehicle Weight (lbs) 1/	Load		Inflation Pressure (psi)
			Position	Per tire (lbs)	
14.00-20	12	16,250	RR	4,126	45
			LR	4,663	--
			RF	3,932	--
			LF	3,922	--

1/ Values in vehicle-payload column represent total payloads for the applicable test vehicles as used in determining the tire loads shown.

4.5.9 Tire weight. Tires checked for weight conformance to paragraph 3.4 shall be weighed on a scale graduated in ounces or tenths of pounds.

4.6 Inspection of preparation for delivery. The preservation, packaging, packing, and marking of the tires shall be inspected to determine conformance to the applicable requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing and marking. Preservation, packaging, packing and marking shall be in accordance with the applicable requirements of Specification MIL-T-4 and the method and applicable levels of protection specified (see 6.2).

6. NOTES

6.1 Intended use. These tire assemblies are to be placed on wheeled vehicles intended for use in police operations and in combat areas by the Armed services.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Preproduction sample if required (see 3.1).
- (c) Where engineering evaluation sample is to be sent if other than noted herein (see 3.7).
- (d) When lot formation differs from that specified in 4.3.1.1.
- (e) Applicable levels of packaging, packing and marking (see 5.1).

6.3 Load ratings and pressure.

6.3.1 Maximum load ratings. The maximum load rating and tire pressure on which the test loads and pressures are based (see Table IV), are the same as the maximum recommended tire loads and pressures shown in the Tire and Rim Association, Inc. Year Book and in the Military Tire and Rim Data Book.

6.4 Flap codes. The tire flap code referred to in this specification (see 3.4.5) is the same as the tire flap code designation shown in the Tire and Rim Association, Inc. Year Book and in the Military Tire and Rim Data Book.

6.5 Government control specimen. The Government control specimen is a special compound made and used by the Government in the ozone tests (see 3.9), as a control or comparison specimen for determining the ozone resistance qualities of the manufacturer's product. The manufacturer may at any time make and use the compound for test purposes in evaluating ozone resistance of his own compounds. The specimens are compounded to the following formula and cured as specified herein. No mold lubricant is used during the process.

Materials	Parts by weight
SBR-1500	100.00
Philblack O	40.00
EPC Black (Micronex W6)	10.00
ZnO (Jersey Zinc)	3.00
Stearic Acid (Open)	1.50
Circo Light Oil (Sun Oil)	3.50
Para Flux 2016 (Standard)	3.50
Atlantic No. 1115 Wax	1.50
Santoflex AW	2.00
U.O.P. 88	2.00
Sulfur (Rubber Makers)	2.00
Santocure	1.25
Total	170.25

6.6 Contractor, definition of. The term contractor as used in the specification is defined as the organization having a direct contract with one Government activity. The term manufacturer is defined as the organization actually performing the operations covered by this specification. The contractor may or may not be the manufacturer.

6.7 Tire assembly, definition of. The term tire assembly as used in this specification is defined as the tire and flap.

Custodian:
Army - AT

Preparing activity:
Army - AT

Project No. 2610-A098

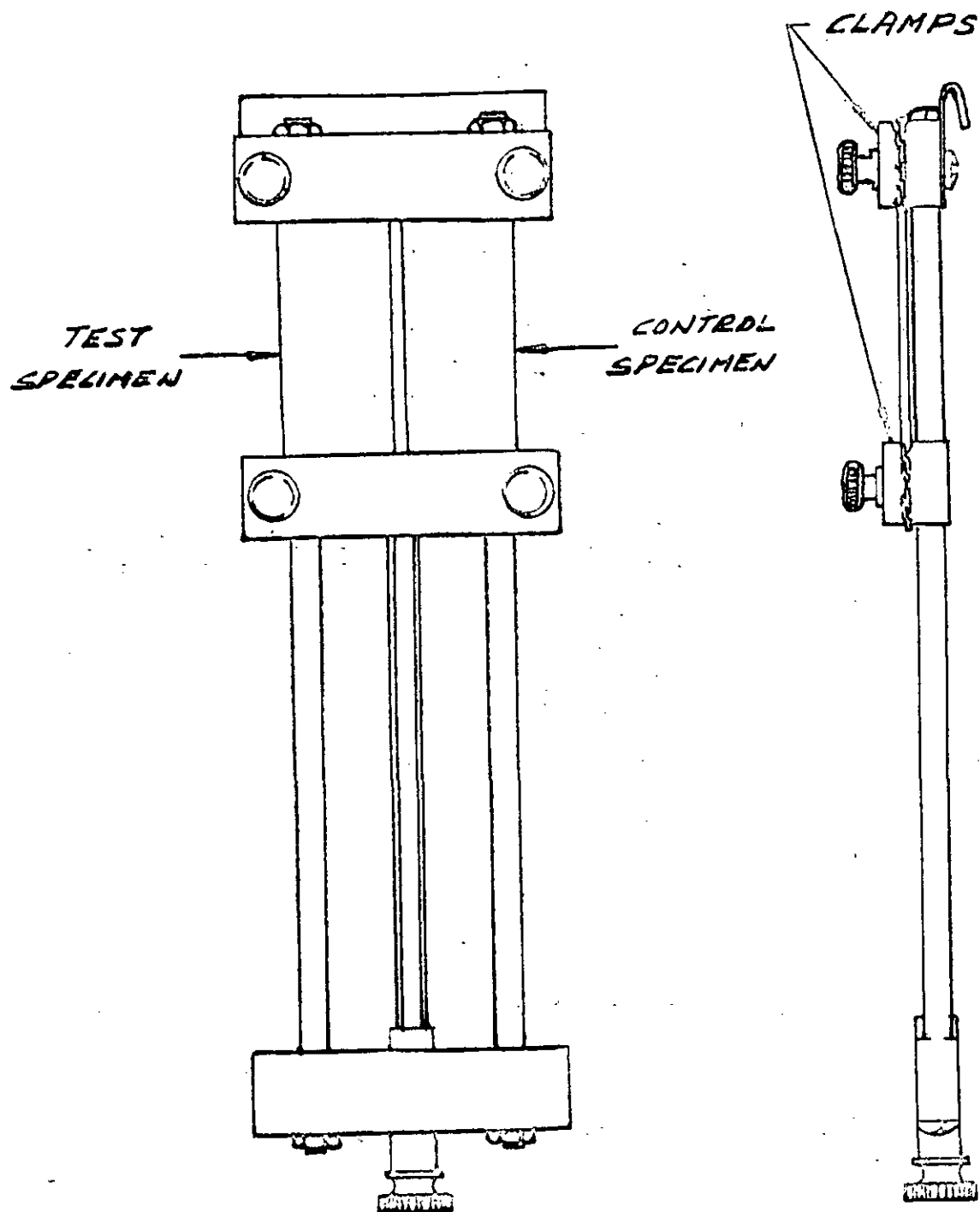


FIG. 1. SPECIMEN HOLDER

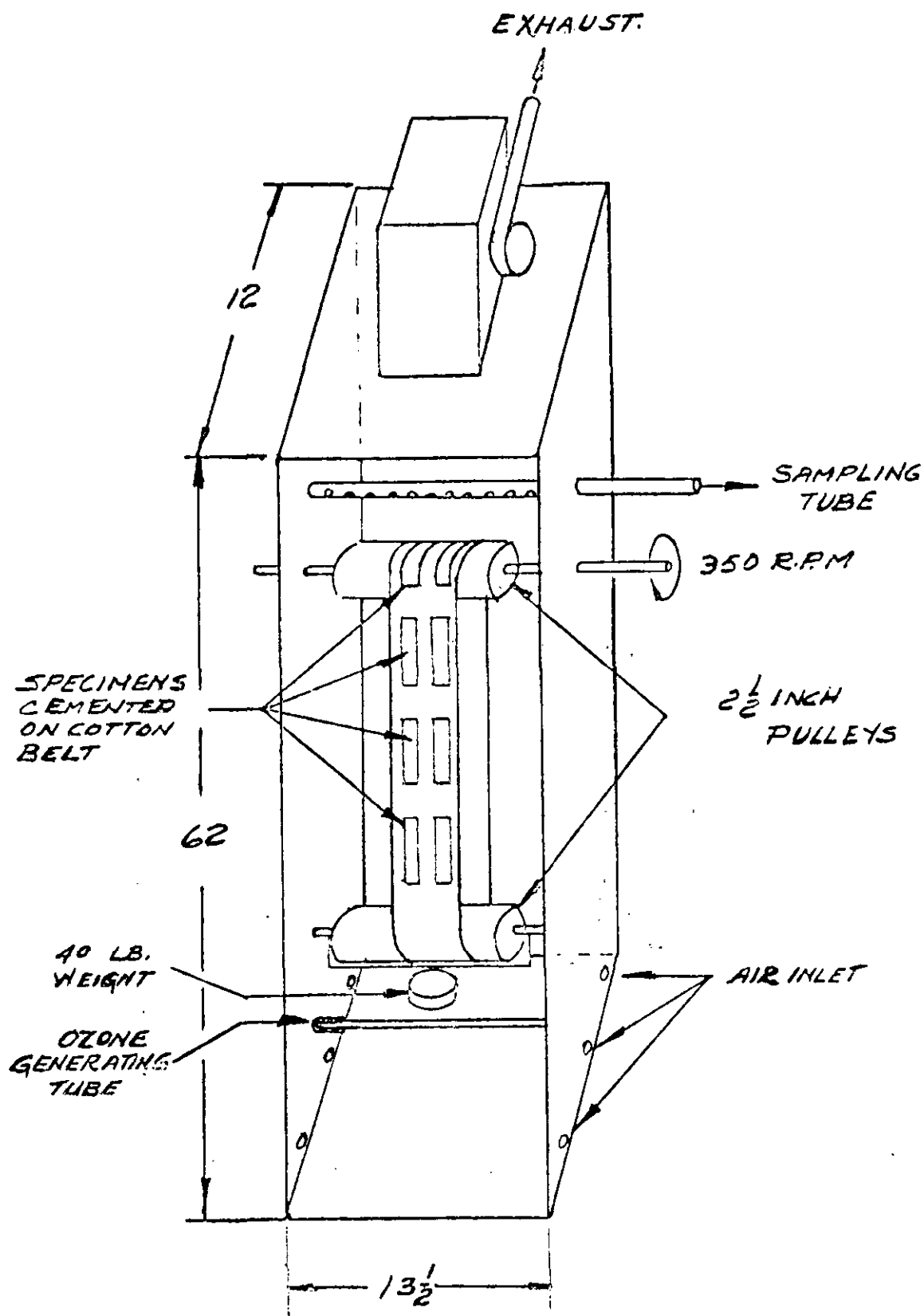
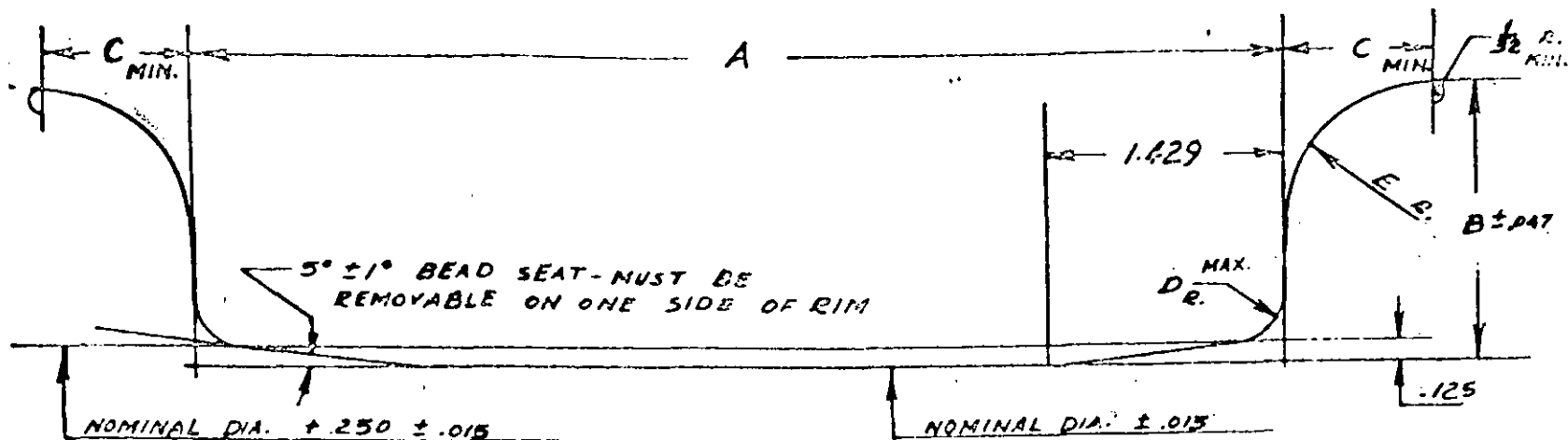


FIG. 2 DYNAMIC OZONE TESTING APPARATUS



RIM	A	B	C	D	E
10.0	10.0 ± .187	2.0	1.07	.312	1.00

FIGURE 3- MEASURING RIM CONTOURS

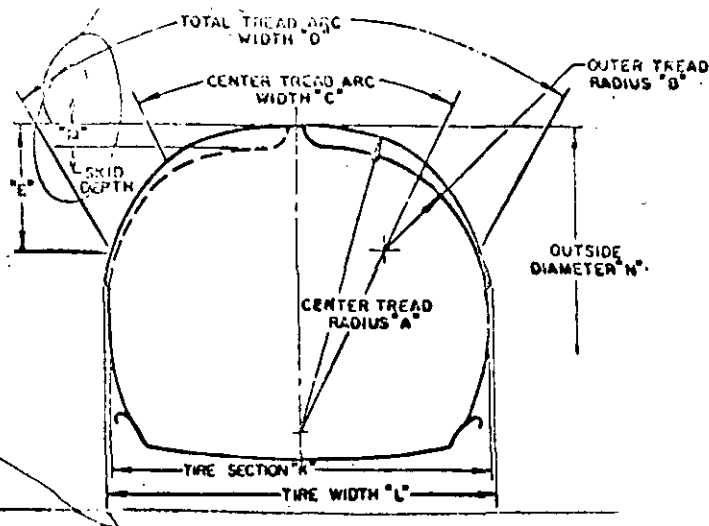


Figure 4. Directional, Aggressive

Tire size	Ply rating	Constr. type	Measuring rim	Bead (inches)		"K" (inches)		"L" max inches	"H" max (inches)		"N" (inches)	
				Width	Tol	Max	Min		(mold)		Max	Min
14.00-20	12	TRUCK	10.0			15.05	14.60	15.50	.80		49.9	48.7

NOTES:

1. In determining the dimensions based on "K", the maximum value of "K", as shown in the above chart is to be used.
2. "A" = 75-85% of "K"
3. "B" = 36-40% of "K"
4. "C" = 40-44% of "K"
5. "D" = 75-85% of "K"
6. "E" = 11.5-12.5% of "K"
7. Increase the maximum "K" dimensions by 5 percent for nylon cord tires.
8. Increase the maximum "L" dimensions by 5 percent for nylon cord tires.
9. Maximum calculated section height is defined as maximum outside diameter (column N) minus the nominal rim diameter divided by two (2). Measured section height may exceed maximum calculated section height by not more than 2 1/2 percent for nylon cord tires.

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 22-R255
INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.		
SPECIFICATION		
ORGANIZATION		
CITY AND STATE	CONTRACT NUMBER	
MATERIAL PROCURED UNDER A ☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? ☐ YES ☐ NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

DD FORM 1426
1 JAN 66

REPLACES EDITION OF 1 OCT-64 WHICH MAY BE USED.

S/N-0102-014-1801 C-25254