

INCH-POUND
MIL-DTL-11040G
15 January 2009
SUPERSEDING
MIL-DTL-11040F
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DETAIL SPECIFICATION

BELT, V: ENGINE ACCESSORY DRIVE, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers general requirements for standard and heavy duty endless V-type engine accessory drive belts of various lengths and belt widths. The belts are either plain or notched or cogged base.

1.2 Classification. Belts are of the following grades, styles and belt widths. (See [1.2.1](#), [1.2.2](#), and [1.2.3](#))

1.2.1 Grade. The V-belts are of the following grades.

A - Standard duty. See [3.3.1.1](#)

B - Heavy duty. See [3.3.1.2](#)

1.2.2 Style. The V-belts are of the following styles.

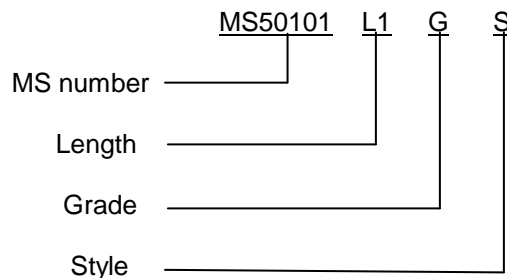
P - Plain base.

C - Notched or cogged base.

1.2.3 Belt width. The V-belts are of the following widths and belt thickness:

| | |
|--------------------------------------|--|
| 0.380 (9.65) X .312 (7.92) MS51065 | 0.750 (19.05) inch X 0.438 (11.13) MS51068 |
| 0.500 (12.70) X .406 (10.31) MS51066 | 0.875 (22.23) inch X 0.500 (12.70) MS51069 |
| 0.688 (17.48) X .406 (10.31) MS51067 | 1.000 (25.40) inch X 0.562 (14.30) MS51070 |

Part or Identifying Number (PIN) example:



Comments, suggestions, or questions on this document should be addressed to: (Defense Supply Center, Columbus, DSCC-VAI, 3990 East Broad Street, Columbus, OH 43218-5000), or emailed to, FluidFlow@dsccl.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online at <http://assist.daps.dla.mil>.

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

| | | |
|-------------|---|--|
| MIL-STD-130 | - | Identification Marking of U.S. Military Property |
| MS51065 | - | Belt, V: Engine Accessory Drive (0.380 Width) |
| MS51066 | - | Belt, V: Engine Accessory Drive (0.500 Width) |
| MS51067 | - | Belt, V: Engine Accessory Drive (0.688 Width) |
| MS51068 | - | Belt, V: Engine Accessory Drive (0.750 Width) |
| MS51069 | - | Belt, V: Engine Accessory Drive (0.875 Width) |
| MS51070 | - | Belt, V: Engine Accessory Drive (1.000 Width) |

(See supplement 1 for list of associated specification sheets.)

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil>, or from the Standardization Document Order Desk, 700 Robbins Avenue, Building. 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | | |
|-----------|---|---|
| ASTM D471 | - | Standard Test Method for Rubber Property, Effect of Liquids |
|-----------|---|---|

(Copies of these documents are available online at <http://astm.org> or from ASTM International, P.O. Box C700, 100 Barr Harbor Dr. West Conshohocken, PA 19428.)

NCSL INTERNATIONAL

| | | |
|-------------|---|---|
| NCSL Z540.3 | - | Laboratories, Calibration, And Measuring And Test Equipment |
|-------------|---|---|

(Copies of these documents are available online at <http://www.ncsli.org> or from NCSL International 2995 Wilderness Place, Suite 107 Boulder, Colorado 80301-5404)

SAE INTERNATIONAL

| | | |
|----------|---|-----------------------------------|
| SAE J636 | - | V-Belts and Pulleys (DoD adopted) |
|----------|---|-----------------------------------|

(Copies of these documents are available online at <http://www.sae.org> or from the SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), 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. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Belts furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2.1 Qualification by similarity. Qualification of belts of 0.380 inch top width will qualify a manufacturer, at his request, for all belts of top width of 0.500 inch or less and qualification of belts of 0.688 inch top width will qualify a manufacturer, at his request, for all belts of top width greater than 0.500 inch provided the belts have the same design and manufacturing process as specified herein.

3.3 Materials. Materials shall be as identified herein or as approved by the qualifying activity. However, when a definite material is not specified, a material shall be used which will enable the belts to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guarantee of acceptance of the finished product.

3.3.1 Cords. Cords shall be as specified herein, shall be prestretched, and shall be impregnated with a rubber compound.

3.3.1.1 Grade A. Cords for grade A belts shall be natural or synthetic.

3.3.1.2 Grade B. Cords for grade B belts shall be polyester.

3.3.2 Fabric. Fabric shall be woven or knit of natural or synthetic fibers, and shall be impregnated with rubber.

3.3.3 Rubber. Rubber shall be either natural or synthetic.

3.3.4 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Design and construction. Each belt shall be an endless loop having a trapezoidal cross-section with a belt width and a belt thickness as specified in table I. The belt shall consist of tension members (inserts) and a compression member. Covers may be used. The members shall be tightly banded with rubber.

3.4.1 Tension members. Tension members shall be uniformly spaced in a direction parallel to the circumference of the belt, and shall be imbedded in the belt structure.

3.4.2 Compression members. Compression members shall form the narrower trapezoidal portion of the belt in the section below the tension members and shall support the belt in the pulleys. The base that forms the inner circumference of the belt shall be plain, notched, or cogged.

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3.4.3 Cover. The cover, if used, shall consist of one or more plies of bias-cut fabric or cord, frictioned or impregnated with rubber.

3.4.4 Splicing. Not more than two transverse splices shall be allowed in any ply or fabric within a length of 66 inches or less.

3.4.5 Sizes. Sizes of belts (widths and effective lengths) shall be as specified herein and as specified in, MS51065, MS51066, MS51067, MS51068, MS51069, and MS51070 or as specified in table I (see 6.2).

TABLE I. Belt cross-section.

| Belt Width (inch) | Belt Thickness (inch) |
|-----------------------|-----------------------|
| MS51065 0.380 (9.65) | 0.313 (7.95) |
| MS51066 0.500 (12.70) | 0.406 (10.31) |
| MS51067 0.688 (17.48) | 0.406 (10.31) |
| MS51068 0.750 (19.05) | 0.438 (11.13) |
| MS51069 0.875 (22.23) | 0.500 (12.70) |
| MS51070 1.000 (25.40) | 0.562 (14.27) |

3.4.6 Oil resistance. When specified (see 6.2), the belt shall be oil resistant.

3.5 Belt matched sets. When specified (see 6.2), belts shall be furnished in matched sets of the size and number of belts required.

3.6 Performance.

3.6.1 Examination of product. The belt shall conform to the requirements of this specification and the applicable specification sheet when visually examined as specified in 4.7.1.

3.6.2 Effective length tolerance.

3.6.2.1 Single belts. The effective length tolerance for grade A single belts, when tested as specified in 4.5.2, shall not exceed the center distance tolerance specified in table II. The effective length tolerance for grade B single belts when tested as specified in 4.7.2 shall not exceed the center distance tolerance specified in table III.

TABLE II. Effective length tolerance, grade A.

| Length | Effective belt length (inches) | Tolerance on center distance | |
|--------|--------------------------------|------------------------------|--------------|
| | | Plus | Minus |
| L1 | 40 and less | 0.125 (3.18) | 0.156 (3.96) |
| L2 | Over 40 and through 50 | 0.125 (3.18) | 0.188 (4.78) |
| L3 | Over 50 and through 60 | 0.156 (3.96) | 0.219 (5.56) |
| L4 | Over 60 and through 80 | 0.188 (4.78) | 0.281 (7.14) |
| L5 | Over 80 | 0.219 (5.56) | 0.344 (8.74) |

TABLE III. Effective length tolerance, grade B.

| Effective belt length (inches) | Tolerance on center distance plus or minus |
|--------------------------------|--|
| 50 and less | 0.125 (3.18) |
| Over 50 and through 60 | 0.156 (3.96) |
| Over 60 and through 80 | 0.188 (4.78) |
| Over 80 | 0.219 (5.56) |

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3.6.2.2 Matched set. Belts of matched sets shall conform to the effective-length tolerance specified in table II for grade A belts and table III for grade B belts, except that the difference in effective length, between test pulley centers of the longest and shortest belt in any one matched set, shall not exceed .062 inch for grade A belts, and the differences in length specified in table IV for grade B belts, when tested as specified in 4.7.2.

TABLE IV. Matched set tolerance, grade B belts.

| Belt width | | Difference in length between test pulley centers | |
|------------|-------|--|------|
| inch | mm | inch | mm |
| 0.380 | 9.65 | 0.04 | 1.02 |
| 0.500 | 12.70 | 0.04 | 1.02 |
| 0.688 | 17.48 | 0.06 | 1.52 |
| 0.750 | 19.05 | 0.06 | 1.52 |
| 0.875 | 22.23 | 0.06 | 1.52 |
| 1.000 | 25.40 | 0.06 | 1.52 |

3.6.3 Rideout. The top of the belt with respect to the top of the pulley groove shall be within the limits specified in table V, when tested as specified in 4.7.3 (see figure 1).

TABLE V. Rideout.

| Belt Width | | Rideout \pm 0.031 (0.79) | |
|------------|---------|----------------------------|------|
| inches | mm | inches | mm |
| 0.380 | (9.65) | 0.063 | 1.60 |
| 0.500 | (12.70) | 0.063 | 1.60 |
| 0.688 | (12.48) | 0.094 | 2.39 |
| 0.750 | (19.05) | 0.094 | 2.39 |
| 0.875 | (22.23) | 0.094 | 2.39 |
| 1.000 | (25.40) | 0.094 | 2.39 |

3.6.4 Electrical resistivity. The electrical resistivity of the belt shall be not greater than 300,000 ohms when tested as specified in 4.7.4.

3.6.5 Oil-resistance. When specified (see 6.2) the belt thickness shall increase no more than 20 percent after exposure to IRM 903 oil (see ASTM D471), and shall decrease (shrink) no more than 1 percent after exposure to ASTM No. 1 oil (see ASTM D471), when tested as specified in 4.7.5.

3.6.6 Resistance to temperature. The belts shall not crack, break, or require more torque to start or continue rotation than that specified in table VI when tested as specified in 4.7.6.

TABLE VI. Maximum torque requirements.

| Top width (inches) | Torque required to start (maximum) | Torque required to continue (maximum) |
|---------------------|------------------------------------|---------------------------------------|
| Less than 0.688 | 20 ft. lbs. | 12.5 ft. lbs. |
| 0.688 through 0.750 | 25 ft. lbs. | 15.0 ft. lbs. |
| 0.875 through 1.000 | 30 ft. lbs. | 20.0 ft. lbs. |

3.6.7 Resistance to fatigue. The belts shall not crack, break, or slip in excess of 8 percent after two permissible adjustments to compensate for slippage when tested as specified in 4.7.7.

3.7 Age. When specified (see 6.2), the age of the belts shall be not more than 12 months (4 quarters) old from the time of manufacture to the date of acceptance by the Government.

3.8 Marking.

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3.8.1 Single belts. Unless otherwise specified, the belts shall be marked on the outside circumference in accordance with MIL-STD-130, items identified by Military or Industry Association Numbers; in addition, the date of manufacture shall be shown by quarter and year (example 1Q98), or month and year (example Jan 98) or week and year (example 3-98). Ink imprinting or permanent mold marking is acceptable.

3.8.2 Matched sets. Each belt of a matched set shall be marked as specified in 3.8.1. In addition, all belts of a matched set shall be tied together. A tag or separate label shall include the following notice: "WARNING: THIS IS A MATCHED SET. DO NOT BREAK TIES EXCEPT AT INSTALLATION."

3.9 Workmanship. The belt shall be fully formed and symmetrical. When layed on a flat surface, the belt shall exhibit no evidence of twisting. The belt shall exhibit no evidence of delamination, chatter marks or melting. The outer circumference of the belt shall be square with the inner circumference. The belt shall be free from imbedded foreign material and shall be clean on the exterior.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein shall be classified as follows:

- a. Qualification inspection (see 4.4)
- b. Conformance inspection (see 4.5).
 1. Individual tests (see 4.5.2).
 2. Sampling tests (see 4.5.3).
 3. Periodic control tests (see 4.5.4).

4.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment (i.e. Industry Standard, Military Standard, etc.) shall be in accordance with NCSL Z540-3 or equivalent.

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.6.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity on sample units produced with equipment and procedures actually used in production. Qualification inspection shall be as specified in table VII.

TABLE VII. Inspection requirements.

| Inspection or test | Requirement | Test | Qualification | Quality conformance inspection | | |
|-------------------------------------|-------------|-------|---------------|--------------------------------|----------------|------------------------|
| | | | | Individual tests <u>1/</u> | Sampling tests | Periodic Control tests |
| Examination of product | 3.6.1 | 4.7.1 | X | X | | |
| Effective length tolerance | 3.6.2 | 4.7.2 | X | | X | |
| Rideout | 3.6.3 | 4.7.3 | X | | X | |
| Electrical resistivity | 3.6.4 | 4.7.4 | X | | | X |
| Oil resistance | 3.6.5 | 4.7.5 | X | | | |
| Resistance to temperature <u>2/</u> | 3.6.6 | 4.7.6 | X | | | X |
| Resistance to fatigue <u>2/</u> | 3.6.7 | 4.7.7 | X | | | |

1/ 100% inspection required on all V-belts supplied to this specification.

2/ These are destructive test.

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4.4.1 Samples for qualification. Samples for qualification shall be representative of the products proposed to be furnished to the Government. Samples shall consist of three belts of each grade and belt width manufactured by the same process.

4.4.2 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.4.3 Retention of qualification. To retain qualification, the contractor shall forward a report at 12-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. The report shall consist of:

a. A summary of the results of the sampling tests, indicating as a minimum the number of lots and quantities that have passed and the number that have failed. The results of tests of all reworked sampling lots shall be identified and accounted for.

b. A summary of the results of tests performed for periodic inspection (periodic control tests), including the number and mode of failures. The summary shall include results of all periodic inspection tests performed and completed during the 12-month period. If the summary of test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

4.4.3.1 Periodic qualification report. Failure to submit the report within 30 days after the end of each 12-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification. In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during two consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit his qualified products to testing in accordance with the qualification inspection requirements.

4.5 Conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of individual tests and sampling tests.

4.5.2 Individual tests. Each belt shall have been subjected to and passed all the individual tests specified in table VII. Any belt which fails any test criteria in the individual test sequence shall be removed from the lot at the time of observation or immediately at the conclusion of the test in which the failure was observed.

4.5.3 Sampling tests. Sampling tests shall consist of the tests specified in table VII in the order shown. These tests shall be performed on a production lot basis. Random samples shall be selected to form an inspection sample. If one or more defects are found in the inspection sample, then the production lot shall be inspected for that particular defect and defects removed. A second inspection sample shall be selected from the production lot and all sampling tests again performed. If one or more defective items are found in the second inspection sample, the production lot shall be rejected and shall not be supplied to this specification.

4.5.3.1 Production lot. A production lot shall consist of belts manufactured on the same production line(s) by means of the same production techniques, materials, controls, and design during the same production run.

4.5.3.2 Inspection sample. The inspection sample shall be product selected at random from the production lot without regard to quality and shall be the size specified in table VIII.

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TABLE VIII. Inspection sample.

| Production lot Size | Accept on Zero sample Size |
|---------------------|----------------------------|
| 1 to 8 | All |
| 9 to 90 | 8 |
| 91 to 150 | 12 |
| 151 to 280 | 19 |
| 281 to 500 | 21 |
| 501 to 1,200 | 27 |
| 1,201 to 3,200 | 35 |
| 3,201 to 10,000 | 38 |
| 10,001 to 35,000 | 46 |

4.5.4 Periodic control tests. A sample of belts shall be randomly selected in table VII. Parts shall be as representative as possible of the production lots for the time period that they represent (for example, parts shall be from different lots, different production dates, different ID's etc.) Parts tested must be from actual production lots and are not to be built just for testing. If there has been limited production for a specific product for a period of two years, the qualifying activity has the option of requiring the manufacturer to perform periodic control tests. If there has been no production for a specific product for a period of two years, the qualifying activity has the option of requiring the manufacturer to perform periodic control tests prior to the next shipment of product.

4.5.4.1 Nonconformance. If a sample fails to pass any periodic control test, the manufacturer shall immediately notify the qualifying activity and cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity has been taken. After the corrective action has been taken, the periodic control test shall be repeated on additional samples (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Sampling tests (and periodic control tests, if applicable) may be reinstituted; however, final acceptance shall be withheld until the periodic control tests have shown that the corrective action was successful. In the event of failure after inspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.4.2 Disposition of test specimens. Test specimens which have been subjected to periodic control tests shall not be delivered on a contract or purchase order.

4.6 Test conditions.

4.6.1 Temperature and pressure. Unless otherwise specified, tests shall be conducted at local ambient temperature and barometric pressure.

4.7 Methods of inspection. The following identified tests and test methods assure belt integrity within typical operating conditions and applications. Alternate commercial industry standard test methods are allowed; however when an alternate method is used, documented approval must be obtained from the qualifying activity prior to the performance of the test. The test methods described herein are proven methods and shall be the referee method in case of dispute.

4.7.1 Examination of product. The belt shall be visually examined for the defects specified in table IX, defects for visual examination. With documented approval from the qualifying activity, statistical quality control may be used for visual examination. Requirements shall be as specified in 3.6.1.

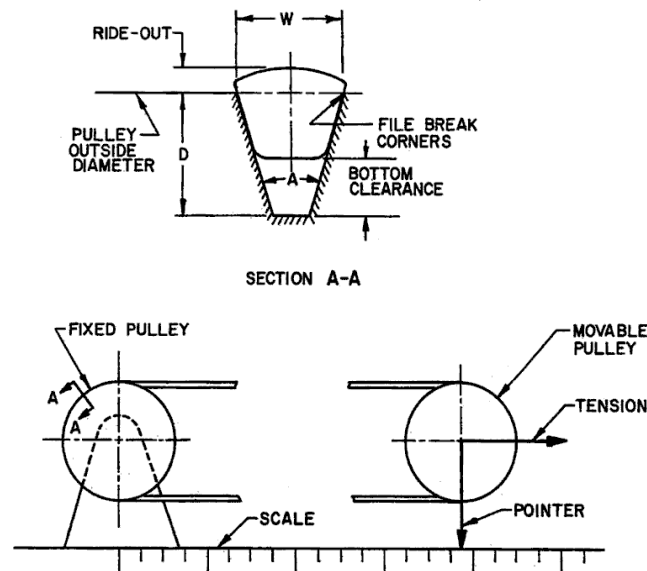
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TABLE IX. Defects for visual examination.

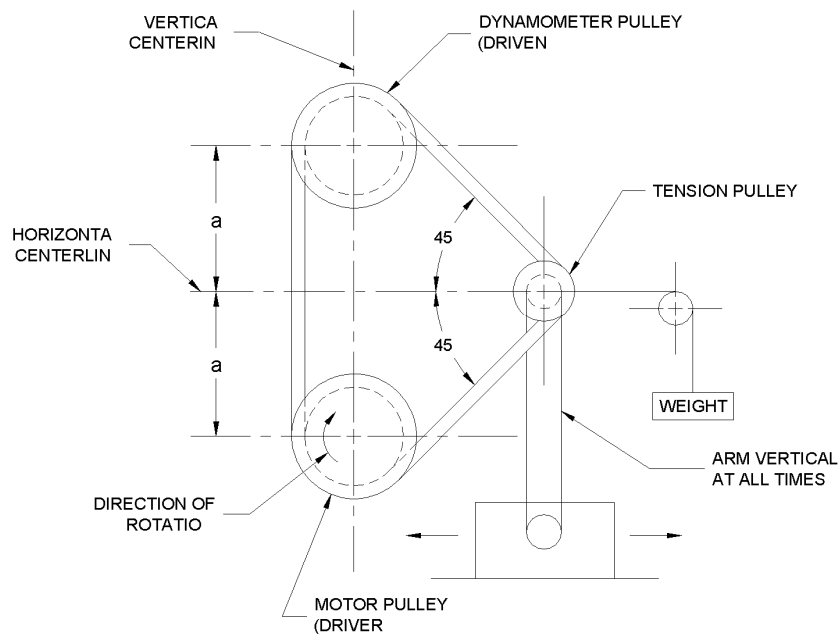
| Defect | Defect |
|---|--|
| 101. Design of belt not as specified | 201. Protrusion, top or bottom |
| 102. Tension members frayed, knotted, or not completely imbedded. | 202. Foreign material, top or bottom |
| 103. Compression member not of symmetrical profile or contains cavities or melted spots | 203. Open longitudinal seam, top or bottom |
| 104. Age of belt over 12 months, when specified | 204. Loose transverse seam, top or bottom |
| 105. Indentation, any side, top or bottom | 205. Torn cover, top or bottom |
| 106. Press lap defect | 206. Identification marking not in accordance with MIL-STD-130 |
| 107. Flow distortion | 207. Matched sets not tied together with warning notice |
| 108. Flash untrimmed (acceptable if removed) | 208. Scratch, not through a ply |
| 109. Protrusion, wearing side | 209. Cogging missed (one cog) |
| 110. Blister, any side | 210. Wrinkle in cover, tension member not distorted |
| 111. Foreign material, wearing side | 211. Cogging cut-out overlap |
| 112. Open longitudinal seam, any side | 212. Mold induced ridges on top of belts |
| 113. Loose transverse seam, wearing side | |
| 114. Torn cover, wearing side | |
| 115. Trim cut | |
| 116. Cogging cut-out skipped | |
| 117. Marking, with wrong information | |
| 118. Marking, missing or illegible | |
| 119. Matching faulty | |
| 120. Porosity in cogging area | |
| 121. Scratch through ply | |

4.7.2 Effective length tolerance. The effective length tolerance shall be determined by belt length. The belt shall be subjected to the length test specified in SAE J636. Conformance to effective length tolerances for grade A belts, grade B belts and matched sets shall be as specified in 3.6.2.

4.7.3 Rideout. The rideout of the belt shall be determined in accordance with the rideout test specified in SAE J636. Conformance shall be as specified in 3.6.3 (see figure 1).

FIGURE 1. Test fixture and pulleys for determining belt effective length, rideout and bottom clearance.

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NOTE: Dimension "a" is adjusted for various length belts to maintain tension pulley midway vertically between driver and driven pulleys.

FIGURE 2. General pulley arrangement for low temperature and fatigue tests.

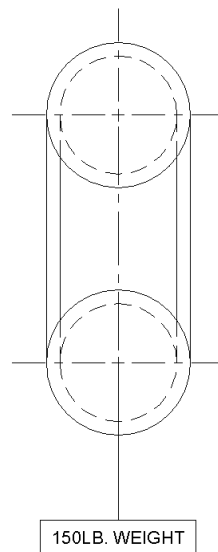


FIGURE 3. Tensioning of belt for electrical conductance test.

4.7.4 Electrical resistance.

4.7.4.1 Apparatus. The apparatus shall be an electronic-type ohmmeter operating at a potential of 500 volts dc, plus or minus 100 volts. The ohmmeter shall have a range sufficiently great to measure the ohm resistance of the belt being tested with an accuracy of plus or minus 5 percent.

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4.7.4.2 Preparation. Clean one side wall of the belt of all foreign matter.

4.7.4.3 Electrodes. Place eight electrodes in contact with the cleaned surface of the belt side wall. The electrodes shall be the depth of the belt and shall have a width of .500 inch. The electrodes shall be square or rectangular in shape and shall consist of either brass or coatings of a colloidal dispersions of graphite in distilled water. Equally space and mark the electrodes as shown on figure 4.

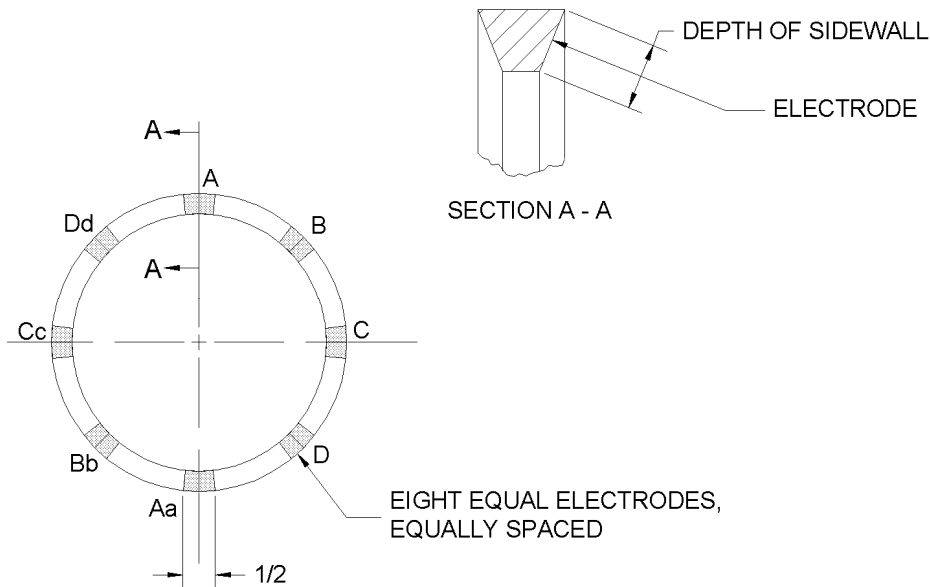


FIGURE 4. Dimensions, spacing, and marking of electrodes for electrical conductance test.

4.7.4.4 Conditioning and evaluating graphite electrodes. If a colloidal dispersion of graphite is used for electrodes, condition the belt at room temperature for 24 hours or until the electrodes dry. After drying, determine the resistance (from corner to corner) of each individual electrode with the test probes of the ohmmeter contacting as small an area as practicable. If the meter reading is more than 1000 ohms, apply another coating of the colloidal dispersion of graphite in distilled water to avoid erroneously high readings and repeat the drying and resistance measurement.

4.7.4.5 Procedure. Suspend the belt for not less than 30 seconds on two pulleys with a 150-pound weight suspended from the lower pulley (see figure 3 and table VII). Within one minute after removal of tension, measure the resistance between opposite electrodes (A to Aa, B to Bb, see figure 4). A resistance reading higher than 300,000 ohms shall constitute failure of this test.

4.7.5 Oil resistance. Six belt sections, three inches long, shall be used for oil resistance test. Measure and record each belt section thickness at the center and a maximum of .500 inch from each end. Three belt sections shall be immersed in ASTM Oil No. 1 and three belt sections shall be immersed in IRM 903 Oil as specified in ASTM D471. The temperature of the oils shall be maintained at a minimum of 150 °F with the belt sections immersed in the oil for a minimum of 22 hours. At the completion of the immersion the thickness of each belt section shall be measured at the center and a maximum of .500 inch from each end. The percent increase or decrease in thickness of any specimen shall be recorded as the average of the three readings for that specimen. Conformance shall be as specified in 3.6.5.

4.7.6 Resistance to temperature. Place the belt in an air oven in an unrestrained horizontal position and maintain the temperature of the oven at 150° F, plus or minus 2° F, for 12 hours. At the end of 12 hours, remove the belt from the oven and allow to cool for 30 minutes at room temperature. Then install the belt on the pulley and panel assembly (see figure 2 and in table X) and apply belt tension with the applicable weight for the width being tested as specified in table X. The tension weights may be applied as

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shown on figure 2 or the panel may be turned 90 degrees with the tension pulley at the bottom and the tension weights suspended from the tension pulley. Lock tension pulley location and remove the tension weights from the belt. Then place the assembly of belts and pulleys in the cold chamber and maintain the chamber at a temperature of minus 65° F, plus or minus 5° F, for 12 hours. At the end of 12 hours and while in the cold chamber, rotate the pulleys by means of a torque wrench applied to the drive pulley until the belt has been rotated not less than two complete revolutions. Record the torque to start and the torque to continue rotations. Examine the belt rotation. Evidence of cracks, breakage, or torque higher than the applicable value listed in table IV shall constitute failure of this test. Conformance shall be as specified in 3.6.6.

TABLE X. Dimensions of pulleys for temperature and fatigue tests. 1/ 2/

| Belt width | | Diameter of pulley where specified groove width (Without width tolerance) occurs | | | | Groove | | | | Angle | |
|------------|-------|--|-------|---------------------------------|-------|------------------------|-------|-----------|-------|--|------------------------------|
| | | Driver and driven pulleys ±0.010 (.254) | | Tension pulley ±0.010 (.254) | | Width ±0.010 (.254) | | Depth min | | Driver and driven pulleys ±30 min | Tension pulley ±30 min |
| Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm | degrees | degrees |
| 0.380 | 9.65 | 4.75 | 120.7 | 2.75 | 69.9 | 0.380 | 9.65 | 0.438 | 11.13 | 36 | 36 |
| 0.500 | 12.70 | 5.00 | 127.0 | 3.50 | 88.9 | 0.500 | 12.70 | 0.562 | 14.27 | 36 | 36 |
| 0.688 | 17.48 | 4.66 | 118.4 | 3.16 | 80.3 | 0.597 | 15.16 | 0.562 | 14.27 | 36 | 34 |
| 0.750 | 19.05 | 4.91 | 124.7 | 3.29 | 83.6 | 0.660 | 16.76 | 0.625 | 15.88 | 36 | 34 |
| 0.875 | 22.23 | 5.91 | 150.1 | 3.91 | 99.3 | 0.785 | 19.93 | 0.688 | 17.48 | 36 | 34 |
| 1.000 | 25.40 | 6.91 | 175.5 | 4.54 | 115.3 | 0.910 | 23.10 | 0.813 | 20.65 | 36 | 34 |

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

4.7.7 Fatigue.

4.7.7.1 Test fixture. The test fixture shall consist of three pulleys arranged as specified on figure 4 and the following:

- A torque-reaction-type dynamometer.
- A constant-speed motor.
- A means for setting the tension at the value specified for the specific belt width.
- A means of determining belt slip within an accuracy of plus or minus 1 percent.
- A governor arranged to automatically stop the motor drive when the speed of the driven pulley (on dynamometer) drops 8 percent below that of the driver pulley (on motor).
- Pulleys for the belt widths designated shall have dimensions as specified in table X.
- Dial indicator.

4.7.7.2 Test procedure. Install the belt on the test fixture (see figure 4) and apply the applicable tension specified in table XI to the idler pulley. If tension is to be applied to the driven pulley, the tension values specified in table XI shall be multiplied by 1.21. Condition the belt by running with the tensile pulley unrestrained for 5 minutes, plus or minus 15 seconds, under the conditions specified in table XI, do not apply the dynamometer load. Stop the machine and allow the belt to condition for a minimum of 10 minutes. Turn the drive manually for 2 or 3 revolutions of the belt and, by means of a dial indicator mounted in contact with the tension-pulley support bracket, record the maximum limits of travel. Lock the tensioned-pulley support bracket in the position midway between the two limits of travel and remove the tensioning weights. Restart the machine, bring the drive up to test speed and apply the dynamometer load specified in table XI. Continue to operate the machine for 100 ±1/2 hours, in an ambient temperature of between 70°F to 90°F. If slippage exceeds 8 percent, stop the machine, let the belt stand for a minimum of 20 minutes, unlock the tensioning pulley, restore the initial tension, determine, the center position, and relock the tensioning pulley. Restart the machine, bring up to speed, reapply the dynamometer load, and continue the 100-hour run. Conformance shall be as specified in 3.6.7.

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TABLE XI. Condition of fatigue test. 1/ 2/

| Belt width (inches) | Pulley diameters (inches) | | Driver (rpm) minimum | Tension weight at no load (lbs) minimum | Horse-power load minimum | Belt effective length (in) |
|------------------------|--|-----------------------------|----------------------------|---|--------------------------------|-------------------------------|
| | Driver and driven ± 0.010 (.254) | Idler ± 0.010 (.254) | | | | |
| 0.380 (9.65) | 4.75 | 2.75 | 4900 | 60 | 6.0 | Under 40.0 |
| | | | | 70 | 7.0 | 40.0-55.0 |
| | | | | 80 | 8.0 | 55.0 & over |
| 0.500 (12.70) | 5.00 | 3.50 | 4700 | 80 | 8.0 | Under 40.0 |
| | | | | 90 | 9.0 | 40.0-55.0 |
| | | | | 100 | 10.0 | 55.0 & over |
| 0.688 (17.48) | 4.66 | 3.16 | 4900 | 50 | 5.0 | Under 40.0 |
| | | | | 60 | 6.0 | 40.0-55.0 |
| | | | | 70 | 7.0 | 55.0 & over |
| 0.750 (19.05) | 4.91 | 3.29 | 4700 | 55 | 5.5 | Under 40.0 |
| | | | | 65 | 6.5 | 40.0-55.0 |
| | | | | 75 | 7.5 | 55.0 & over |
| 0.875 (22.23) | 4.91 | 3.91 | 3900 | 70 | 7.0 | Under 40.0 |
| | | | | 80 | 8.0 | 40.0-55.0 |
| | | | | 90 | 9.0 | 55.0 & over |
| 1.000 (25.40) | 6.91 | 4.54 | 3350 | 80 | 8.0 | Under 40.0 |
| | | | | 90 | 9.0 | 40.0-55.0 |
| | | | | 100 | 10.0 | 55.0 & over |

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirement shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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 belts covered by this specification are intended to be used on power-transmission applications that require high speed, small-pulley, short-center drives, such as drives on internal combustion engines that transmit power to generators, pumps, fans, and other accessory equipment. This specification does not apply to industrial belts. These belts are intended for use in ambient temperatures as low as minus 65° F.

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6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Applicable QPL and Government designation.
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see [2.2.1](#) and [2.3](#)).
- d. Whether grade B belt is required (see [1.2](#)). Unless otherwise specified, grade A belts should be supplied.
- e. Width and effective length of belts required (see [3.4.5](#)). Express length for belts as “effective length” in acquisition documents.
- f. Whether matched sets are to be furnished and quantity of belts per set required (see [3.5](#)).
- g. Whether oil resistance is required (see [3.4.6](#) and [3.6.5](#)).
- h. Whether the age of belts is not to exceed 12 months (see [3.7](#)).
- i. Packaging requirements (see [5.1](#)).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No.11040 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from (insert name, mailing address, and email of qualifying activity). An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <http://assist.daps.dla.mil> .

6.3.1 Belts procured as components of end items. When belts covered by this specification are components of end items being procured by the Government, the requirements of ASPR 1-1107.2(b) will apply and the contracting officer should include the requirements of ASPR 1-1107.2(b) in the solicitation.

6.4 Subject term (keyword) listing.

Combustion
Fans
Generators
Power-Transmission
Pulley
Pumps

6.5 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see Section 3).

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6.6 Shelf-life. This specification covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings in accordance with MIL-STD-129 or FED-STD-123, preparation of a materiel quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DoD 4140.27-M, *Shelf-life Management Manual*. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <https://www.shelflife.hq.dla.mil/>.

6.7 Shelf life recommendation. Recommend 6 year shelf life in accordance with MIL-HDBK-695.

6.8 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.

CONCLUDING MATERIAL

Custodians:

Army - AT
Navy - YD
Air Force - 99
DLA - CC

Preparing activity:
DLA - CC

(Project 3030-2008-001)

Review activities:

Army - AR, MI, SM
Navy - MC, SH
Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.