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REPUBLIC OF NAMIBIA

NAMIBIA CIVIL AVIATION AUTHORITY

AERONAUTICAL INFORMATION CIRCULAR

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Namibia Civil Aviation Authority
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WINDHOEK

AIC
Series A
62/24
06 March 2024

AIRWORTHINESS

MAINTENANCE - AIRCRAFT MAINTENANCE ENGINEERS

AIRCRAFT WELDERS

1. General
   1.1. NAMCAR Part 66 of the Namibia Civil Aviation Regulations 2001, as amended, requires that any welding of the primary structure, or of any part of the control system or of any other components of a stressed nature on an aircraft to be done only by a qualified welder.
   1.2. A welder shall be deemed to be qualified for a welding process on a material or material group, provided the requirements indicated in this AIC have been complied with.
   1.3. Welder's ratings will be required for:
      1.3.1. oxy-acetylene,
      1.3.2. inert gas shielded arc,
      1.3.3. plasma arc,
      1.3.4. atomic hydrogen,
      1.3.5. metal arc and
      1.3.6. Carbon arc welding processes.
      1.3.7. and for such other processes as the Executive Director may decide, for the following groups or metallic materials:
         a. Group 1 - Aluminium alloys.
         b. Group 2 - Magnesium alloys.
         c. Group 3 - Carbon steels.
         d. Group 4 - Corrosion and heat-resisting steels.
         e. Group 5 - Nickel base and cobalt base alloys.
         f. Group 6 - Titanium alloys.
         g. Group 7 - Copper base alloys.
   1.4. Welder's ratings will be limited to those types of materials or material groups and welding processes on which the applicant has demonstrated his welding ability by means of the tests referred to hereunder.
   1.5. Where a welder is employed by a licensed aircraft maintenance organisation, the responsibility of maintaining a satisfactory standard of competency of the welder concerned will be entrusted to the organisation which use the procedure for establishing such competency as shall set out in this AIC.

2. Privileges of a qualified welder. A qualified welder is permitted to do welded construction and repairs to aircraft and to aircraft components and parts using processes and materials for which he has passed tests as prescribed in NAMCAR Part 66 of the Namibia Civil Aviation Regulations 2001, as amended. Such welding must be done under the direct supervision of, and certified by, an appropriately licensed aircraft maintenance engineer or a person duly appointed by a licensed aircraft maintenance organisation who is to ensure that such certification shall also make reference to the name of the welder who has been responsible for the welding concerned.

3. Welders test for initial ratings
   3.1. Each welder will be required to make test pieces and, at his option, prepare test specimens appropriate to the ratings required. Such test pieces and test specimens must conform to the standards shown in figures 1, 2, 3 and 4 of Appendix A. For test pieces shown in figures 2 and 3 of Appendix A, a 25% variation in tube diameter will be permitted and tubular material wall thicknesses must be within 20% of the range specified.

NOTE: (1) Applicants should endeavour to use for their tests piece materials of the same specifications or the nearest equivalent as those they will be welding on aircraft but, if this provides undue difficulty, similar materials will be acceptable if two control specimens of the parent material conforming to the tensile test specimen of figure 1 of Appendix A are submitted.

   3.2. The test pieces required for the various groups of materials shall be as follows:
      3.2.1. For group 1 and 2 materials, the test pieces shown in Figures 1 and 4 of Appendix A.
      3.2.2. For group 3 and 4 materials, the test pieces shown in Figure 1, for plasma arc welding process, and Figures 2 and 3 for oxy-acetylene and inert gas shielded arc welding processes.
      3.2.3. For group 5, 6 and 7 materials, the test piece shown in Figure 1.
      3.2.4. Where the applicant desires a welder's rating to be limited to certain types of work, e.g. tubular repairs only, such applicable test pieces as shown in Figures 1, 2, 3 or 4 of Appendix A.

NOTE: (1) Figure 3 does not apply in respect of the plasma arc welding process.

   3.3. The welding of test pieces shall be done by each welder in accordance with the requirements of Appendix B and under the supervision of a person appointed for the purpose by the Executive Director. If the welder elects to have the test specimens prepared before these are submitted to the test laboratory for examination, such preparation shall also be under the control of the supervisor.
   3.4. The welds of test pieces and test specimens shall not be hammered, dressed or sand blasted.
   3.5. The supply of welding equipment and test materials shall be the responsibility of the welder concerned.
   3.6. Only one set of test pieces and test specimens will be permitted at a time for each rating for each welder.
   3.7. A welder may abandon any test at any stage if he is dissatisfied with the results. In such cases and in the case of failure to pass the initial test he will only be permitted to do further tests after a period of 30 days during which period he should obtain additional welding experience. If a welder fails the second revalidation test, all the prescribed tests for that group of metallic material will have to be satisfactorily completed after a further period of 30 days.

3.8. A welder only becomes qualified for a material or material group using the appropriate welding process on the date that the approved examiner indicates on the relative TV 2/59 form that the test concerned was satisfactory.

4. Welding tests for revalidation
   4.1. Each welder will normally be required to do a test piece for each rating for which revalidation is required and, at his option, prepare the necessary test specimens in accordance with figure 1 of Appendix A. For such tests the provisions of subparagraphs 3.1 and 3.4 to 3.8 inclusive shall apply.
   4.2. A welder may abandon any revalidation test at any stage if he is dissatisfied with the results.
   4.3. In cases where the privileges of a rating have lapsed for more than 6 months, the complete test must be satisfactorily completed before the privileges of the rating concerned are again exercised.

5. Supervision of the execution of welding test pieces and test specimens
   5.1. NAMCAR Part 66 of the Namibia Civil Aviation Regulations 2001, as amended, states that each welding test should be done under the supervision of a person appointed by the Director. In this respect it is the responsibility of the welder to ensure that the person, who is to supervise the test, has been appointed as required by this regulation.
   5.2. Persons appointed to supervise the welding of test pieces and to control the preparation of test specimens must complete the necessary forms and forward this together with the test pieces or test specimens to an approved laboratory. A list of approved test laboratories is given in Appendix C. A separate form TV 2/59 must be used for each welding process employed.
   5.3. It will also be the responsibility of the supervisor to ensure that test pieces or test specimens are suitably marked or labelled to readily identify them with the welder, and with the relative completed form.

6. Examination of test pieces and test specimens. The examinations to which welded test pieces and specimens will be subjected will be as outlined in the LS/3 document issued to approved test laboratories by the Executive Director.

7. Forms. Aircraft Maintenance Organisation may use their own printed form provided it conforms substantially in pattern with requirements of the test laboratory.

8. In view of the foregoing, certificates of competency in respect of aircraft welders will not be issued by the Executive Director. Qualified welders should therefore retain a copy of form in respect of the welding test for initial rating as well as a copy of the form which covers the latest validation test. Where a welder is employed by a licensed aircraft maintenance organisation, the completed forms may be retained by such organisation.

APPENDIX A

A.1 SHEET TO SHEET BUTT WELD

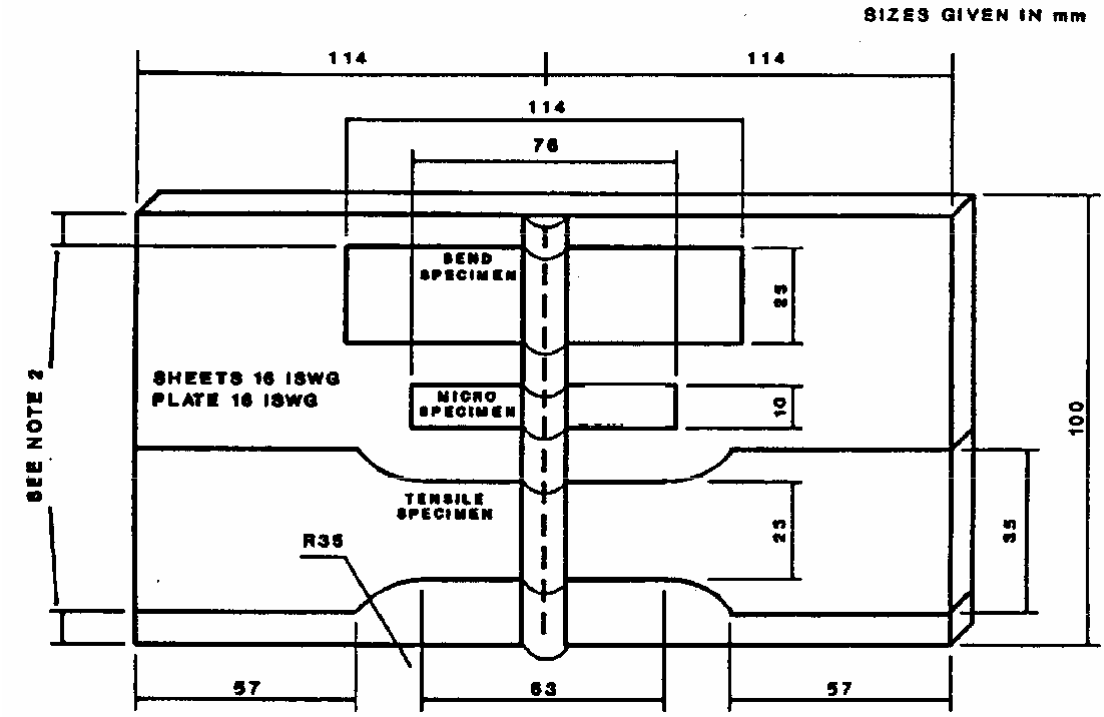

Figure 1

NOTES:
(1) ISWG = Imperial or British Standard wire gauge.
(2) Enough discard so that the beginning and end of the run is not included in the test specimen.

A.2 SHEET TO TUBE WELD

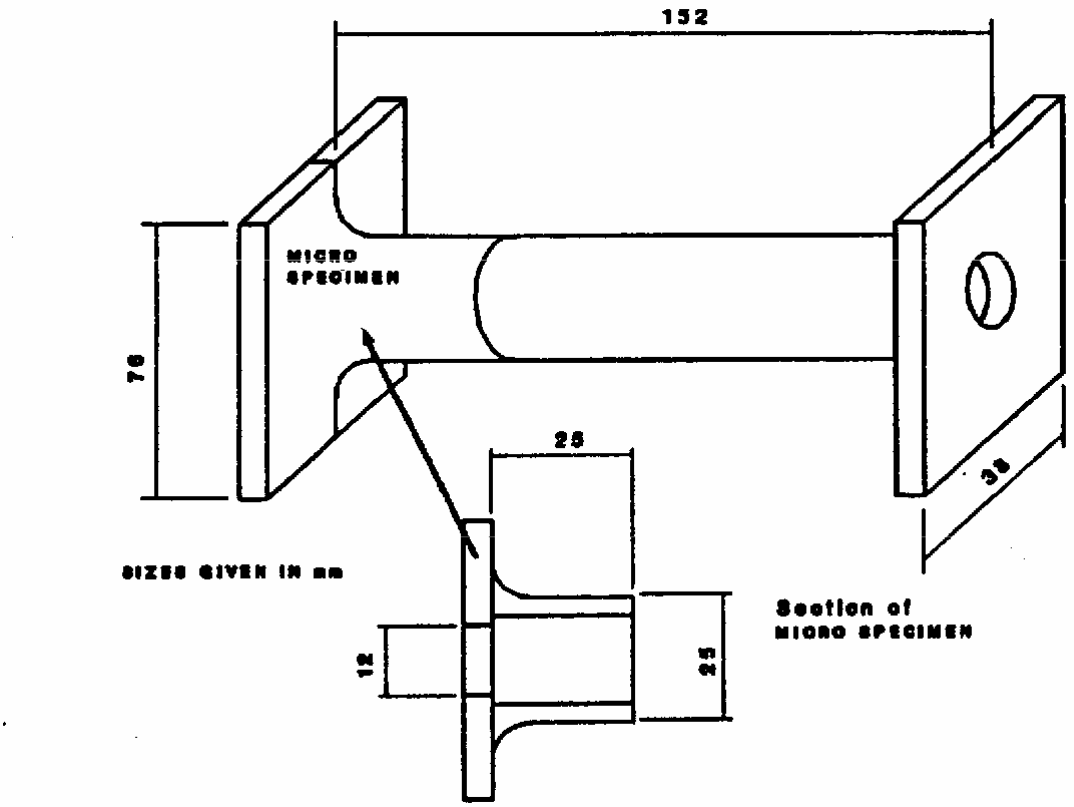

Figure 2

NOTES:

(1) A variation of up to 25% in tube diameter will be permitted for tubular material but wall thickness of tubes must be within the dimensions specified.

(2) For Oxy-acetylene welding use tube 20 ISWG (0,889 - 1,016 mm) and end plates 16 ISWG (1,626 - 1,676 mm).

(3) For ARC welding use tube 16 ISWG (1,626 - 1,676 mm) and end plates 16 ISWG (1,626 - 1,676 mm).

A.3 TUBE TO TUBE WELD

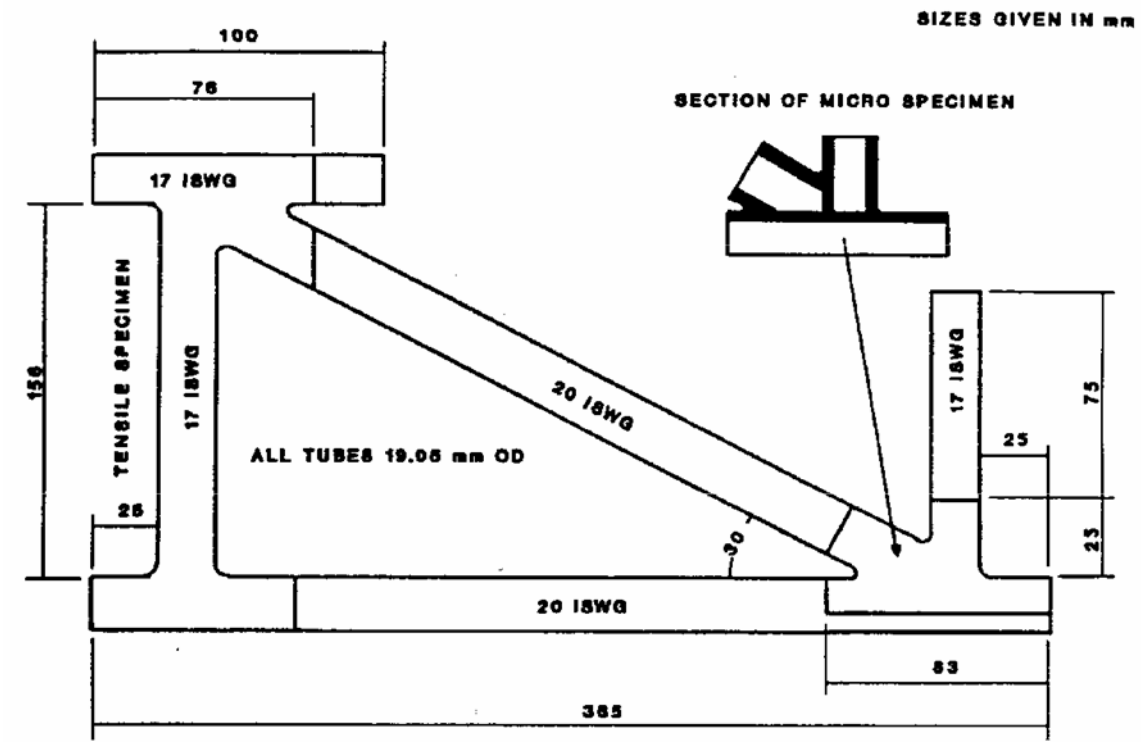

Figure 3

NOTES:

(1) A variation of up to 25% in tube diameter will be permitted for tubular material but wall thickness of tubes must be within the dimensions specified.

(2) For ARC welding, substitute 14 ISWG (1,829 - 2,108 mm) for 17 ISWG (1,422 - 1,473 mm) and 16 ISWG (1,626 - 1,676 mm) for 20 ISWG (0,899 - 1,016 mm).

A.4 BLOCK BUILD-UP

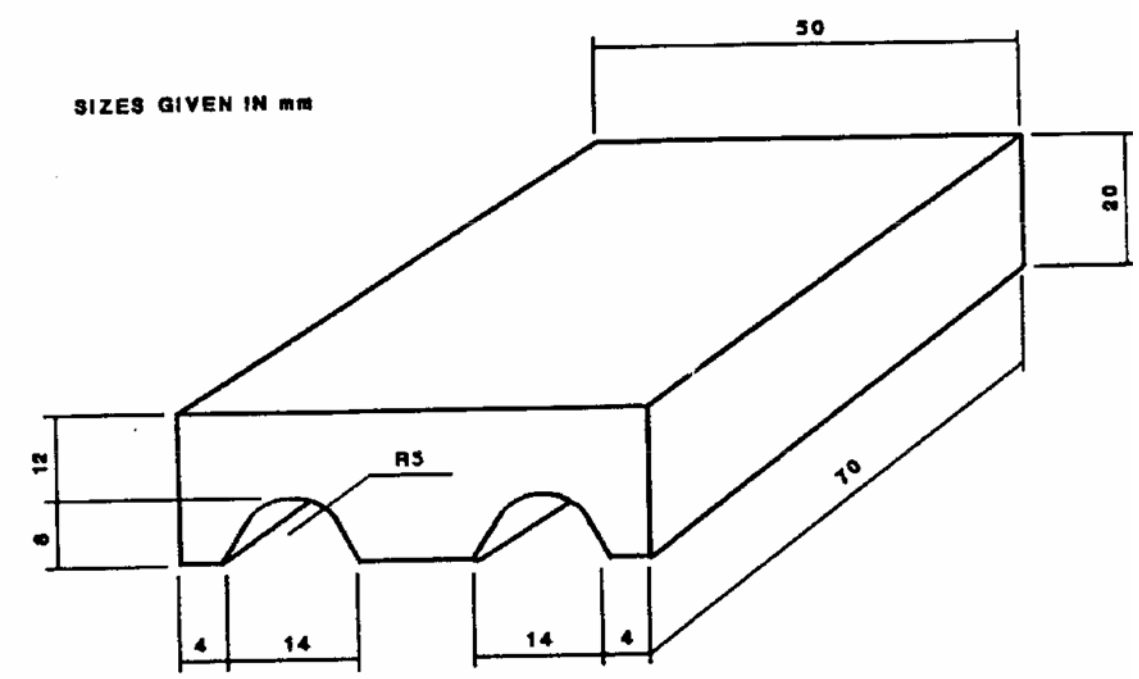

Figure 4

APPENDIX B

MAINTENANCE: METHODS OF PREPARATION OF WELDED TEST PIECES AND TEST SPECIMENS

1. The preparation of welded test pieces for the groups of materials specified in Circular No. 62.6 shall be as follows:
    1.1. Figure 1 of Appendix “A” Sheet to Sheet Butt Weld
        1.1.1. Edges of sheets to be welded shall be chamfered when 16 ISWG or thicker material is used except for aluminium and aluminium alloys in which case edge preparation is not necessary for material thinner than 12 I.S.W.G.
        1.1.2. Welds shall be performed by forward welding from one side only using correct flux and filler rod.
    1.2. Figure 2 of Appendix “A” Sheet to Tube Weld
        1.2.1. The centre of each end plate must be drilled with a 12 mm diameter hole prior to welding. The ends of the tube need not be chamfered for material thinner than 16 ISWG
        1.2.2. End plates may be positioned with tack welds and the first to be welded shall be done with the end plate flat on the bench and the tube in the vertical position; this weld shall be completed by working around the test piece. The second end plate shall be welded to the tube with the tube in the horizontal position and not moved during the process of completing the weld; this weld shall be completed by working under and over the test piece.
        1.2.3. The specimen for microscopic examination is to be cut from one end of the test piece as indicated in Figure 2. The remainder of the test pieces is to be preserved and submitted for any further examination which may be considered necessary should the results of the microscopic examination raise any doubt.
    1.3. Figure 3 of Appendix “A” Tube in Tube Weld
        1.3.1. After preparation of the tubes for welding they shall be assembled in a jig and tack welded.
        1.3.2. The assembly shall then be removed from the jig and mounted in a vertical position with the longest tube (365 mm) at the lowest point. The assembly shall not be moved from this position during the process of completing the welds.
        1.3.3. The uppermost joint formed by the short horizontal, vertical and diagonal tubes shall be welded by the "overhead" welding technique and the remaining joints completed by working around the test piece.
    1.4. Figure 4 of Appendix “A” Block build-up
        Do a build-up operation of the U cut-out on the machined block, by multiweld runs, to a level slightly above that of block surface.

APPENDIX C

MAINTENANCE: APPROVED TEST LABORATORIES

1. The test laboratories operated by the undermentioned organisations have been approved by the Executive Director for the purpose of examining and testing welded test pieces and specimens.

2. SOUTH AFRICAN BUREAU OF STANDARDS
Address correspondence to:
The Director-General:
South African Bureau of Standards Private Bag X191
PRETORIA 0001
Tel: (012) 428-6824

3. SOUTH AFRICAN AIRWAYS
Address correspondence to:
Private Bag 12
Jan Smuts Aerodrome 1627
Tel: (011) 9782904

4. SIMERA, A DIVISION OF DENEL (PTY) LTD
Address correspondence to: PO Box 117
KEMPTON PARK 1620
Tel: (011) 9272571