ISO 16338:2017-01 (E)

Welding for aerospace applications - Resistance spot and seam welding

Contents

Page

Foreword v

1 Scope 1

2 Normative references 1

3 Termsanddefinitions 1

4 Symbols and abbreviated terms 4

5 Specificengineeringrequirements 4

6 Classificationofthejoint 4

7 Productionrequirements 4

8 Weldingpersonnelrequirements 5

9 Personresponsibleforweldingprocedurequalificationandweldingmachine qualificationtests 5

10 Materialgroups 5

11 Preparation of parts to be welded 5
11.1 General 5
11.2 Cleaning requirements 5
11.3 Surface coatings 6
11.4 Assembly 6

12 Equipmentrequirements 6
12.1 Welding machines 6
12.2 Electrodes 6
12.3 Shear testing machines 6
12.3.1 General 6
12.3.2 Stationary shear testing machines 6
12.3.3 Portable shear testing machines 6
12.4 Jigs and fixtures 6

13 Weldingmachines 6
13.1 Qualification requirements 6
13.1.1 General 6
13.1.2 Method of welding machine qualification 7
13.2 Test piece configuration and examination requirements 8

14 Weldingprocedure(WPS) 9
14.1 Qualification requirements 9
14.1.1 General 9
14.1.2 Determination of weld settings 9
14.1.3 Methods of welding procedure qualification 9
14.1.4 Thickness combination limits 10
14.1.5 Welding procedure specification (WPS) 10
14.1.6 Welding procedure requalification 11

14.2 Test piece configuration and examination requirements 11

15 Qualityrequirementsforproduction 13
15.1 General 13
15.2 Production witness testing 13
15.2.1 General 13
15.2.2 Witness test specimens 13
15.2.3 Surface resistance 13
15.2.4 Parameter adjustments 13
15.2.5 Production witness test specimen configuration and examination 14
15.2.6 Alternate testing requirements in lieu of production witness testing 16
15.3 Production parts 16
15.3.1 Examination requirements 16
15.3.2 Deterioration of welding quality 16
15.3.3 Tack welds 16

16 Test pieces 16
16.1 Standard test pieces 16
16.2 Test pieces for specific purposes 20

17 Examination, testing and acceptance criteria 20
17.1 General 20
17.2 Visual examination 20
17.2.1 Visible imperfections in test specimens or production parts 20
17.2.2 Sheet separation between welded members 21
17.2.3 Electrode indentation 21
17.3 Radiographic examination 22
17.4 Metallographic examination 24
17.4.1 General 24
17.4.2 Electrode indentation 24
17.4.3 Internal imperfections 25
17.4.4 Nugget penetration 25
17.4.5 Nugget diameter or seam weld width 26
17.5 Mechanical testing 27
17.5.1 Spot welds -- Sheet 27
17.5.2 Spot welds -- Foil 31
17.5.3 Seam welds -- Foil 31
17.5.4 Multiple members test specimen 31

18 Weldingprocedurequalificationrecord(WPQR) 32

Annex A (informative)Machinequalificationtestreportform 33

Annex B (informative) WPS form 36

Annex C (informative)Formsforweldingprocedurequalificationrecord(WPQR)--Examples 37

Annex D (informative)Commentaryonmachinequalification 39

Bibliography 42