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Welding Inspection(WIS)TWI Training & Examination Services Granta Park, Great Abington Cambridge CB21 6AL, UK Copyright TWI Ltd1Welding InspectionContentsSection 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 Subject Typical Duties of Welding Inspectors Terms and Definitions Welding Imperfections and Materials Inspection Destructive Testing Non-Destructive Testing WPS/ Welder Qualifications Materials Inspection Codes and Standards Welding Symbols Introduction to Welding Processes MMA Welding TIG Welding MIG/MAG Welding Submerged Arc Welding Thermal Cutting Processes Welding Consumables Weldability of Steels Weld Repairs Residual Stress and Distortion Heat Treatment Arc Welding Safety Calibration Application and Control of Preheat Practical Visual Inspection Macro and Micro Visual Inspection AppendicesRev 1 January 2009 Contents Copyright TWI Ltd 20092Section 1 Typical Duties of Welding Inspectors31GeneralWelding Inspectors are employed to assist with the quality control (QC) activities that are necessary to ensure that welded items will meet specified requirements and be fit for their application. For employers to have confidence in their work, Welding Inspectors need to have the ability to understand/interpret the various QC procedures and also have sound knowledge of welding technology. Visual inspection is one of the nondestructive examination (NDE) disciplines and for some applications may be the only form. For more demanding service conditions, visual inspection is usually followed by one or more of the other non-destructive testing (NDT) techniques surface crack detection and volumetric inspection of butt welds. Application Standards/Codes usually specify (or refer to other standards) that give the acceptance criteria for weld inspection and may be very specific about the particular techniques to be used for surface crack detection and volumetric inspection, they do not usually give any guidance about basic requirements for visual inspection. Guidance and basic requirements for visual inspection are given by: BS EN 970 (Nondestructive Examination of Fusion Welds Visual Examination)2Basic Requirements for Visual Inspection (to BS EN 970)BS EN 970 provides the following: Requirements for welding inspection personnel. Recommendations about conditions suitable for visual examination. The use of gauges/inspection aids that may be needed/helpful for inspection. Guidance about information that may need to be included in the inspection records. Guidance about when inspection may be required during the stages of fabrication.A summary of each of these topics is given in the following sections.Rev 1 January 2009 Typical Duties of Welding Inspectors Copyright TWI Ltd 200943Welding Inspection PersonnelBefore starting work on a particular contract, BS 970 states that Welding Inspectors should: Be familiar with relevant standards*, rules and specifications for the fabrication work that is to be undertaken Be informed about the welding procedure(s) to be used Have good vision in accordance with EN 473 and should be checked every 12 months(* standards may be National or Client) BS EN 970 does not give or make any recommendation about a formal qualification for visual inspection of welds. However, it has become industry practice for inspectors to have practical experience of welding inspection together with a recognised qualification in Welding Inspection such as a CSWIP Qualification.4Conditions for Visual Inspectionillumination BS EN 970 states that the minimum illumination shall be 350 lux but recommends a minimum of 500 lux*. * normal shop or office lighting Access Access to the surface, for direct inspection, should enable the eye to be Within 600mm of the surface being inspected In a position to give a viewing angle of not less than 30600mm (max.) 30 (min.)Rev 1 January 2009 Typical Duties of Welding Inspectors Copyright TWI Ltd 20095Aids to Visual InspectionWhere access is restricted for direct visual inspection, the use of a mirrored boroscope, or a fibre optic viewing system, are options that may be used usually by agreement between the contracting parties. It may also be necessary to provide auxiliary lighting to give suitable contrast and relief effect between surface imperfections and the background. Other items of equipment that may be appropriate, to facilitate visual examination, are: Welding gauges (for checking bevel angles and weld profile, fillet sizing, measuring undercut depth). Dedicated weld gap gauges and linear misalignment (high/low) gauges. Straight edges and measuring tapes. Magnifying lens (if a magnification lens is used to aid visual examination it should be X2 to X5).BS 970 has schematics of a range of welding gauges together with details of what they can be used for and the precision of the measurements that can be made.6Stages When Inspection May Be RequiredBS EN 970 states that examination is normally performed on welds in the aswelded condition. This means that visual inspection of the finished weld is a minimum requirement. However, BS EN 970 goes on to say that the extent of examination, and the stages when some inspection activity is required, should be specified by the Application Standard or by agreement between client and fabricator. For fabricated items that must have high integrity, such as pressure vessels and piping or large structures inspection activity will usually be required throughout the fabrication process, namely: Before welding During welding After weldingInspection activities at each of these stages of fabrication can be considered to be the Duties of the Welding Inspector and typical inspection checks that may be required are described in the following section.Rev 1 January 2009 Typical Duties of Welding Inspectors Copyright TWI Ltd 200967Typical Duties of a Welding InspectorThe relevant standards, rules and specifications that a Welding Inspector should be familiar with at the start of a new contract are all the documents he will need to refer to during the fabrication sequence in order to make judgements about particular details. Typical documents that may need to be referred to are: The Application Standard (or Code) (for visual acceptance criteria see note below*) Quality plans or inspection check lists (for the type and extent of inspection) Drawings (for assembly/fit-up details and dimensional requirements) QC procedures (Company QC/QA procedures such as those for document control, material handling, electrode storage and issue, WPSs etc)*Note: Although most of the requirements for the fabricated item should be specified by National Standards, Client Standards or various QC Procedures, some features are not easy to define precisely and the requirement may be given as to good workmanship standard. Examples of requirements that are difficult to define precisely are some shape tolerances, distortion, surface damage or the amount of weld spatter. Good workmanship is the standard that a competent worker should be able to achieve without difficulty when using the correct tools in a particular working environment. In practice the application of the fabricated item will be the main factor that influences what is judged to be good workmanship or the relevant client specification will determine what is the acceptable level of workmanship. Reference samples are sometimes needed to give guidance about the acceptance standard for details such as weld surface finish and toe blend, weld root profile and finish required for welds that need to be dressed by grinding or finishing. A Welding Inspector should also ensure that any inspection aids that will be needed are: In good condition Calibrated as appropriate/as specified by QC proceduresRev 1 January 2009 Typical Duties of Welding Inspectors Copyright TWI Ltd 20097Safety consciousness is a duty of all employees and a Welding Inspector should: Be aware of all safety regulations for the workplace Ensure that safety equipment that will be needed is available and in suitable conditionDuties before welding Check Material Action In accordance with drawing/WPS Identified and can be traced to a test certificate In suitable condition (free from damage and contamination WPSs Have been approved and are available to welders (and inspectors) Welding equipment in suitable condition and calibrated as appropriate Weld preparations in accordance with WPS (and/or drawings) Welder qualifications Identification of welders qualified for each WPS to be used. All welder qualification certificates are valid (in date) Welding Those to be used are as specified by the WPSs are consumables being stored/controlled as specified by the QC Procedure joint fit-ups In accordance with WPS/drawings tack welds are to good workmanship standard and to code/WPS Weld faces Are free from defects, contamination and damage Preheat (if required) Minimum temperature is in accordance with WPS Duties during welding Check Site/field welding process Preheat (if required) Interpass temperature Welding consumables Welding parameters Root run Gouging/grinding Interrun cleaning Welder Action Ensure weather conditions are suitable/comply with Code (conditions will not affect welding) In accordance with WPS Minimum temperature is being maintained in accordance with WPS Maximum temperature is in accordance with WPS Inn accordance with WPS and being controlled as Procedure Current, volts, travel speed are in accordance with WPS Visually acceptable to Code (before filling the joint) (for single sided welds) By an approved methPage 2Welding Inspection (WIS) TWI ♦ Training & Examination Services Granta Park, Great Abington Cambridge CB21 6AL, UK Copyright © TWI Ltd 1 November 2010 Examination...CSWIP 3.1 (WELDING INSPECTOR) MULTIPLE CHOICE QUESTIONS 1. When "H2 control" is specified for a manual metal arc welding project, the electrode would normally be: (a) Cellulose...Plate Thumb Print Report Example Name (Block capitals) Joe BLOGGS Signature Joe Bloggs Test piece identification Example 1 Code used BW/V1/00 Welding process MMA (SMAW) Joint...WELDING INSPECTION (WISS) Section Title 1) Terms & Definitions V 2) 3) 4) 5) 6) Duties & Responsibilities Welding Imperfections Mechanical Testing Welding ProceduresWelder...TWI WIS 5 Course WELDING INSPECTION OF STEELS Section 1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12) 13) 14) 15) 16) 17) 18) 19) 20) 21) 22) 23a) 23b) Title Duties & Responsibilities...WELDING INSPECTION (WISS) Section 1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12) 13) 14) 15) 16) 17) 18) 19) 20) 21) 22) 23) Title Terms & Definitions V Duties & Responsibilities...Cswip 3.1 training documentWELDING INSPECTION (WIS5) TWI Ltd, Training and Examination Services WORLD CENTRE FOR MATERIALS JOINING TECHNOLOGY Welding Inspection Rev 0 Jun 06 Copyright © 2006, TWI...CSWIP 3.1 (WISS) - Print VersionWORLD CENTRE FOR MATERIALS JOINING TECHNOLOGY WELDING INSPECTION (WIS5) TWI Ltd, Training and Examination Services Section 01 Typical Duties of Welding Inspectors Welding...CSWIP 3.1 Notes April 2013CSWIP 3.1 - Welding Inspector - Level 2 WIS5 Training & Examination Services Granta Park, Great Abington Cambridge CB21 6AL, UK Copyright © TWI Ltd Rev 2 April 2013...An Introduction to CSWIP 3.1AN INTRODUCTION TO CSWIP 3.1 By MR ANSAR BALOCH Contents Terms & Definition Types of Welds Types of Joints Weld Preparations Types of Single Butt Preparation Butt Welded...CSWIP 3.1 Question and AnswerMULTICHOICE PAPER ONE 1. When 'hydrogen control' is specified for a manual metal arc welding project the electrode would normally be: a. Cellulose b. Iron oxide c. Acid...CSWIP 3.1 Welding Inspection NotesWELDING INSPECTION - STEELS CONTENTS TERMINOLOGY THE DUTIES OF A WELDING INSPECTOR CODES AND STANDARDS THE WELDING PROCEDURE DESTRUCTIVE TESTING SYMBOLS MATERIALS FOUR FACTORS...1-CSWIP 3.1 Bridging With NotesTWI WIS 7 A WS CWI - CSWIP 3.1 Bridge Course The WELDING INSPECTION OF STEELS Section 1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12) 13) 14) 15) 16) 17a) 17b) Title Duties &...cswip 3.1 material pdf. cswip 3.1 study material. cswip 3.1 course material pdf free download. cswip 3.1 study material pdf. cswip 3.1 latest course material. cswip 3.1 course material pdf 2018

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