



## ***EXPERT TECHNOLOGY TOOL***

# **ISO 3834:2005**

Quality requirements for fusion welding of  
metallic materials

# **Benefits and Implementation**

*Revision 1 – 1 August 2008*

The WTIA National Diffusion Networks Project is supported by  
Federal, State and Territory Governments and Australian industry



## **Acknowledgments**

This Expert Technology Tool has been developed as part of the very successful WTIA National Diffusion Networks Project (NDNP). WTIA wishes to acknowledge the contribution of its members, members of WTIA Technical Panels and committees, WTIA SMART Industry Groups and all those in industry who have contributed in various ways as members of a Technology Expert Group to the development of this Expert Technology Tool.

## **Future Editions**

These Technical Guidance Notes will be revised from time to time and comments aimed at improving their content will be welcomed. Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

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### WELDING TECHNOLOGY INSTITUTE OF AUSTRALIA

The Welding Technology Institute of Australia (WTIA) is the recognised national Australian Body representing the overall interests of the Australian "welding" industry, with its primary goal to: "lead and assist in making Australian Industry locally and globally competitive in welding-related activities". The Goal and Strategies within its Business Plan cover the 'Total Life Cycle of Welded Products/Structures'.

The WTIA is a membership based, cooperative, not-for-profit, national organisation representing the Australian welding industry and is registered as a 'Company Limited by Guarantee' under the Australian Corporations Law. WTIA is governed by a Council elected by the Divisions and Corporate Members.

Formed in 1989 through an amalgamation of the Australian Welding Institute (AWI) (founded 1929) and the Australian Welding Research Association (AWRA) (founded 1964), its key roles have been, and still are, predominantly in technology transfer, certification of personnel, education and training, provision of technical services and facilitating research and development.

Through its Council, Boards and Industry Support Groups, and Technical Panels it has representation from a tremendous range of industry, government authorities and educational institutions both locally and internationally.

Membership is offered within various categories and professional levels, presently consisting of approximately 1,400 individual members and 300 company members, whose annual subscriptions provide a significant portion of the operating costs of the organisation.

The current staff of 20 includes 14 engineer/technologists with a variety of specialist backgrounds in welding technology. This expertise is complemented by Industry Support (SMART and Technology Expert) Groups and Technical Panels with over 300 technical specialists, and by a number of WTIA voluntary Divisional Bodies in all States and Territories. Together they contribute on a significant scale to Australian Industry through its excellent network of volunteers throughout Australia and the wide cross-section of its membership from MD to welder.

The WTIA provides a very wide range of services to industry across Australia, Government and individual members. It is the body representing Australia on the International Institute of Welding and it has a number of MOUs with kindred local and overseas bodies. It is actively involved in numerous initiatives to assist in improving the competitiveness of Australian Industry.

### WTIA NATIONAL DIFFUSION NETWORKS PROJECT, SMART TechNet PROJECT and OzWeld TECHNOLOGY SUPPORT CENTRES NETWORK

Welding technology in the broadest sense plays a major role in Australia's well-being and is utilised by over 20,000 Australian businesses large and small with over 300,000 employees. The Welding Technology Institute of Australia (WTIA) is a significant player with industry in promoting improvements in industry through optimum use of Technology.

The Federal Industry Minister, Ian Macfarlane, announced that the WTIA received a \$2.45m grant from the AusIndustry Innovation Access Program (IAccP) – Industry. The Institute launched its Industry Sectoral Projects (ISPs) from 1 September 2003 as part of the WTIA National Diffusion Networks Project. A further grant of \$350,000 enabled the launch of a Medical Devices and Sensors ISP in 2004. The Projects involved the implementation of a structured welding and joining technology demonstration and improvement program in eight Australian industry sectors over three years (2003-2006).

The sectoral strategy involves the WTIA working directly with leading Australian firms, SMEs, supply chains and technology specialists in the OzWeld Technology Support Centres (TSCs) Network to help them:

- analyse and define the key challenges, opportunities and requirements that will govern the competitiveness of Australia's capability in each sector and identify specific areas where welding, joining and fabrication innovation and technology needs to be upgraded and transferred to improve both their own and Australia's competitive advantage and market performance in that sector;
- demonstrate project activities and identify how the solutions can be implemented, document the activities of the demonstration projects and outcomes, disseminate activities to the wider industry and plan activities for future actions needed, including research, development, education, training, qualification and certification;
- document key Expert Technology Tools and Technical Guidance Notes for each technology/sector application and facilitate the ongoing uptake, tailored application and skills development in each of the welding/joining/fabrication technologies identified through the program.

The industry sectors include *rail, road transport, water, pressure equipment, building & construction, mining, medical devices & sensors and defence.*

The NDNP also acts as an umbrella encompassing the two other projects for which WTIA previously received substantial Federal Government, State Government and industry funding.

The OzWeld Technology Support Centres Network continues to support solutions to meet the needs of industry and has been expanded to 35 local and 20 overseas TSCs, all contributing appropriate and leading-edge technologies to assist all industry sectors.

The SMART TechNet Project, with its SMART Industry Groups and Industry Specific Groups (ISGs) already running in the *Power Generation, Petro/Chemical, Gas Pipelines, Alumina Processing, Inspection & Testing and Fabrication industries* continue in parallel with the new Project, with potential for interesting "cross pollination" with groups for the new Industry Sectoral Projects (ISPs) and SMART Groups.

Major benefits from this Project are overall improvement and competitiveness of Australian industry through the use of latest proven technology, economically diffused by a greatly improved network, as well as improved and expanded services to sponsor companies. The Project is believed to be the major practical strategy for rapid improvement of our "welding" businesses. The returns on investment for all parties on the WTIA OzWeld Technology Support Centres Project, SMART TechNet Project and National Diffusion Networks Project have been enormous.

## Total Welding Management System

WTIA advocates the implementation of a Total Welding Management System (TWMS) which would incorporate Quality, Occupational Health and Safety plus Environmental Management Systems. A schematic of a TWMS is found following this introduction. The implementation of ISO 3834:2005 *Quality requirements for fusion welding of metallic materials* forms an integral foundation for the assurance of quality production by a company, with benefits for both bottom-line and local and global competitiveness. WTIA also supports the use of the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication by companies for the implementation of ISO 3834. For further information on tailored products to assist the implementation of such management systems please contact the WTIA.

## Introduction: ISO 3834 Benefits and Implementation

WTIA recommends that ISO 3834:2005 *Quality requirements for fusion welding of metallic materials* is adopted as a mandatory Standard by:

- (i) **Suppliers** of welding services and components to ensure a systematic approach to welding for improved process management in the welding fabrication, construction, manufacturing, repair and maintenance industries and productivity, increased customer satisfaction and global competitiveness.
- (ii) **Asset owners**, (private and government) who must purchase and then repair and maintain welded plant and equipment to ensure greater reliability, longer equipment life, improved health and safety.

Through the WTIA National Diffusion Networks Project (NDNP), the need was identified in each Industry Sector for a series of Technical Guidance Notes (TGNs) to explain the implementation and benefits of ISO 3834. These TGNs complement ISO 3834 Parts 1-6 and the IIW MCS documents and provide information and tools for implementation of the principles of the Standards. They should be read in conjunction with copies of the Standards.

## Definition of Manufacturer

Although in Australia and New Zealand the term 'manufacturer' is often defined in a more limited sense, for the purposes of these TGNs, and in accordance with ISO 3834, a Manufacturer is defined as a 'person or organisation responsible for the welding production'. The Standard uses this term to describe any such organisation involved in manufacturing, fabrication, construction, repair or maintenance as well as other organisations such as asset owners, project management and design companies where the requirements of ISO 3834 are applicable to activities such as weld design, contract development, and the review of technical requirements and competencies of subcontractors.

## This Expert Technology Tool

This Expert Technology Tool (ETT) is currently made up of seven Technical Guidance Notes (TGNs). Others may be added at a later date. Feedback on the need for further TGNs is most welcome.

### TGN-3834-01 and TGN-3834-02 : Questions and Answers

This is included in both a PowerPoint presentation format for use within companies/organisations to explain all the details about ISO 3834 and a separate Question and Answer document for participants for follow up and reference after the presentation and general use.

The Adobe Acrobat .pdf file of the PowerPoint presentation can be viewed in the 'full screen' mode and used as a projection for teaching purposes.

**TGN-3834-03 : How to Specify ISO 3834:2005 Quality requirements for fusion welding of metallic materials: Example from Alcoa World Alumina Australia**

This TGN gives recommended wording that can be put into a purchaser specification or contract document for the supply of welding manufacture, fabrication, construction, repair or maintenance.

**TGN-3834-04 : How to specify training and qualifications of welding coordination personnel**

This TGN gives recommendations on the minimum IIW personnel qualifications and training to satisfy Part 5 of ISO 3834. It also gives recommendations on how non-holders of such qualifications can receive extra training through the IIW ATBs and recognition via WTIA and IIW. The purpose of this document is to assist the manufacturing organisation on the appropriate level of training and qualification for their welding coordination personnel.

**TGN-3834-05 : How to specify tasks and responsibilities for Welding Coordinators to ISO 14731:2006**

The purpose of this TGN is to guide a manufacturing organisation on how to specify the tasks and responsibilities of Welding Coordination Personnel to comply with ISO 3834:2005. A manufacturing organisation may be a company involved in manufacture, fabrication, construction, repair or maintenance as a supplier of services, or an asset owner, purchaser, project manager etc.

The Note includes a welding coordination activities and responsibilities Self-assessment Checklist (Table 2) and Task Allocation Checklist (Table 3,) based on activities and responsibilities detailed in ISO 14731:2006 "Welding coordination - Tasks and responsibilities" as tools for use by manufacturing organisations.

**TGN-3834-06 : How to obtain certification including the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication**

A process by which companies can achieve 3<sup>rd</sup> party recognition and certification to ISO 3834 or ISO 9000/ISO 3834 is described.

**TGN-3834-07 : Self assessment of quality requirements - Checklist and action plan to ISO 3834:2005 Part 2: *Quality requirements for fusion welding of metallic materials***

A checklist that will assist a company in performing a self-assessment of its current position with reference to its compliance with ISO 3834 Part 2.

Please note, ISO 3834:2005 now supersedes AS/NZS ISO 3834:1999. It is anticipated that a revised version of AS/NZS ISO 3834 is expected to take up the 2005 edition of ISO 3834.

## What are they?

An Expert Technology Tool (ETT) is a medium for diffusion and take-up of technological information based on global research and development (R&D) and experience to improve industry performance.

It can be formatted as a hard copy, software (fixed, interactive or modifiable), audiovisual (videos and sound tapes) or physical samples. It can be complemented by face-to-face interaction, on-site and remote assistance, training modules and auditing programs.

The diagram overleaf and the information below show how the WTIA has introduced a group of ETTs to help companies improve their performance.

### *ETT's and the SME – how can they help my Total Welding Management System?*

A Total Welding Management System (TWMS) is a major ETT with supporting ETTs created specifically to assist Australian industry, particularly those Small to Medium Enterprises (SMEs) that do not have the time or finance to develop an in-house system. These companies, however, are still bound by legal requirements for compliance in many areas such as OH&S, either due to government regulation or to contract requirements. The TWMS developed by the WTIA can be tailor-made by SMEs to suit any size and scope of operation, and implemented in full or in part as required.

### *What is Total Welding Management*

Total Welding Management comprises all of the elements shown in the left-hand column of the table shown overleaf. Each of these elements needs to be addressed within any company, large or small, undertaking welding, which wishes to operate efficiently and be competitive in the Australian and overseas markets.

The Total Welding Management System Manual (itself an Expert Technology Tool) created by the WTIA with the assistance of industry and organisations represented within a Technology Expert Group, overviews each of these elements in the left-hand column. It details how each element relates to effective welding management, refers to supporting welding-related ETTs, or, where the subject matter is out of the range of expertise of the authors, refers the user to external sources such as accounting or legal expertise.

### *Knowledge Resource Bank*

The other columns on the diagram overleaf list the Knowledge Resource Bank and show examples of supporting ETTs which may, or may not, be produced directly by the WTIA. The aim, however, is to assist companies to access this knowledge and to recognise the role that knowledge plays in a Total Welding Management System. These supporting ETTs may take any form, such as a Management System e.g. Occupational Health and Safety Management System (OHSMS), a publication e.g. WTIA Technical Note (TN) or Guidance Note (GN or TGN), a video or a Standard through to software, a one-page guidance note or welding procedure.

Clearly, ETTs such as WTIA Technical Notes, various Standards, software, videos etc are readily available to industry.

The group of ETTs shown overleaf relate to a general welding fabricator/contractor. The ETT group can be tailor-made to suit any specific company or industry sector.

A company-specific Knowledge Resource Bank can be made by the company omitting or replacing any other ETT or Standard.

### *Total Welding Management for Industry Sectors*

Total Welding Management Systems and the associated Knowledge Resource Bank are being developed for specific industry sectors, tailored to address the particular issues of that industry and to facilitate access to relevant resources. A company-specific Total Welding Management System can be made by the company adding, omitting or replacing any element shown in the left hand column or ETT or Standard shown in the other columns. This approach links in with industry needs already identified by existing WTIA SMART Industry Groups in the Pipeline, Petrochemical and Power Generation sectors. Members of these groups have already highlighted the common problem of industry knowledge loss through downsizing, outsourcing and privatisation and are looking for ways to address this problem.

The concept of industry specific Total Welding Management Systems and Knowledge Resource Banks will be extended based on the results of industry needs analyses being currently conducted. The resources within the Bank will be expanded with the help of Technology Expert Groups including WTIA Technical Panels. Information needs will be identified for the specific industry sectors, existing resources located either within Australia or overseas if otherwise unavailable, and if necessary, new resources will be created to satisfy these needs.

### *How to Access ETTs*

Management System ETTs, whether they are the Total Welding Management Manual (which includes the Quality Manual), OHSMS Managers Handbook, Procedures, Work Instructions, Forms and Records or Environmental Improvement System, can be accessed and implemented in a variety of ways. They can be:

- Purchased as a publication for use by industry. They may augment existing manuals, targeting the welding operation of the company, or they may be implemented from scratch by competent personnel employed by the company;
- Accessed as course notes when attending a public workshop explaining the ETT;
- Accessed as course notes when attending an in-house workshop explaining the ETT;
- Purchased within a package which includes training and on-site implementation assistance from qualified WTIA personnel;
- Accessed during face-to-face consultation.
- Downloaded from the WTIA website [www.wtia.com.au](http://www.wtia.com.au)

*ETT's created by the WTIA are listed in the back of WTIA Technical Notes. Call the WTIA Welding Hotline on 1800 620 820 for further information.*

# WTIA TOTAL WELDING MANAGEMENT SYSTEM

supported by  
KNOWLEDGE RESOURCE BANK

**TOTAL WELDING  
MANAGEMENT SYSTEM  
MANUAL**

**ETT: MS01**

*(Including Welding Quality  
Management System)*

**KNOWLEDGE RESOURCE BANK**

i.e. resources for the Total Welding Management System

**ETTs: MANAGEMENT SYSTEMS**

**ETTs: OTHER RESOURCES**

**ETTs: STANDARDS**

**ELEMENTS:**

1. Introduction
2. References
3. Management System
4. Management Responsibilities
5. Document Control
6. Production Planning
7. Contracts
8. Design
9. Purchasing (incl. Sub-Contracting)
10. Production & Service Operations
11. Identification and Traceability
12. Welding Coordination
13. Production Personnel
14. Production Equipment
15. Production Procedures
16. Welding Consumables
17. Heat Treatment
18. Inspection and Testing
19. Inspection, Measuring and Test Equipment
20. Non-Conforming Product
21. Corrective Action
22. Storage, Packing and Delivery
23. Quality Records
24. Auditing
25. Human Resources
26. Facilities
27. Marketing
28. Finance
29. OH&S
30. Environment
31. Information Technology
32. Innovation, Research and Development
33. Security
34. Legal

TN19 Cost Effective Quality Management  
TGN-3834 ISO 3834:2005 Quality requirements for fusion welding of metallic materials: Benefits and Implementation

AS/NZS ISO-9001  
ISO 3834

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AS 4620

CR-01 Contract review for welding and allied industries

TN6 Control of Lamellar Tearing  
TN8 Economic Design of Weldments  
TN10 Fracture Mechanics  
TN12 Minimising Corrosion  
TN14 Design & Construction Steel Bins

AS 1228  
AS 4041  
AS 1210

TN1 Weldability of Steels  
TN5 Flame Cutting of Steels  
TN11 Commentary on AS/NZS 1554  
TN15 Welding & Fabrication Q&T Steels  
TN17 Automation in Arc Welding  
TN18 Welding of Castings  
TN21 Submerged Arc Welding  
TN9 Welding Rates in Arc Welding  
Videos – Welding Parts A & B  
GN07 Welding machine inspect/start-up  
GN08 Oxy-fuel inspect/start-up  
TGN Technical Guidance Notes for Industry Sectors  
TN19 Cost Effective Quality Management

AS/NZS 1554  
AS 4458  
AS 1988

ISO 14731

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AS 1554 AS 1796 AS/NZS 3992  
AS 3998

TN1 The Weldability of Steel  
TN19 Cost Effective Quality Management  
TN3 Care & Conditioning of Arc Welding Consumables

AS 1533 AS 2203 AS 2717

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AS 4458

PG01 Weld Defects

AS 2812

TN19 Cost Effective Quality Management

MS02 OHS&R – Managers Handbook  
MS03 OHS&R – Procedures  
MS04 OHS&R – Work Instructions  
MS05 OHS&R – Forms & Records  
MS07-OHSMINE

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MS06 Environmental Improvement MS

TN7 Health & Safety in Welding  
TN22 Welding Electrical Safety  
Fume Minimisation Guidelines  
Video Fume Assessment  
TGN-M-02 Voltage Reducing Devices  
GN09 Laser safety  
GN10 Radiography safety  
TN23 Environmental Improvement Guidelines for Welding

AS/NZS 4801  
AS/NZS 4804

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AS/NZS 14001

NOTE 1: Examples of ETTs listed are not all-embracing and other ETTs within the global information supply can be added.

NOTE 2: Dates and titles for the ETTs listed can be obtained from WTIA or SAI

TGN-3834-01  
***Questions and Answers:  
PowerPoint Slide Show***

*This Adobe Acrobat .pdf file of a PowerPoint presentation can be viewed in the 'full screen' mode and used as a projection for teaching purposes. It is also available (TGN-3834-02) as a Word document for distribution as training notes.*

# The Drive Towards Australian and New Zealand Adoption of ISO 3834 and ISO 14731

WTIA Technical Guidance Note  
TGN-3834-01 Questions & Answers

**Chris Smallbone**  
**WTIA Executive Director**  
**IIW Immediate Past President 2005-2008**

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WTIA TGN-3834-01 ISO 3834 Q&A Rev 0: Slide No. 1



**AusIndustry**



# ENTHUSIASM

*“You can do anything if you have  
**ENTHUSIASM.***

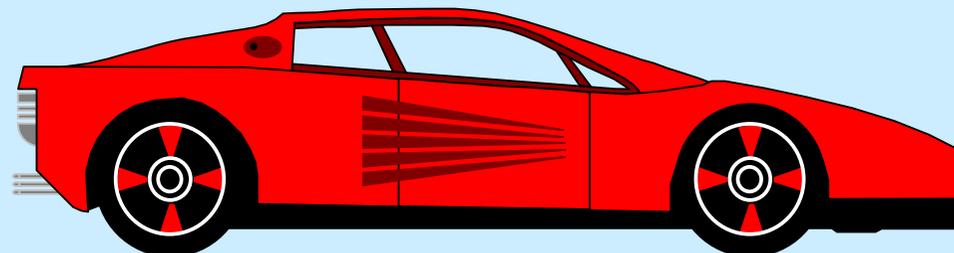
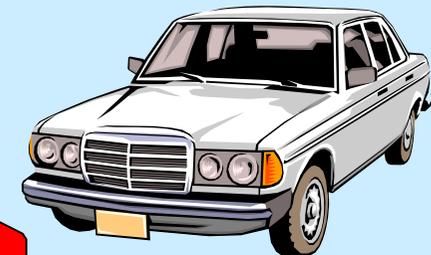
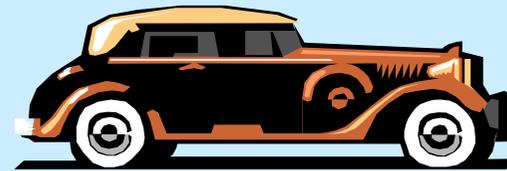
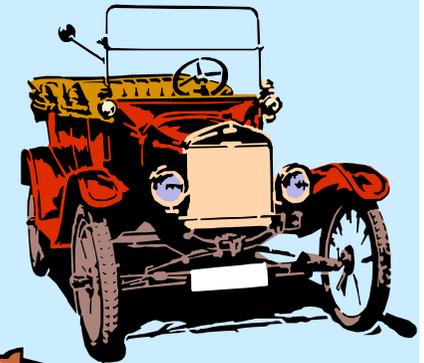
***ENTHUSIASM** is the yeast that makes  
your hopes rise to the stars.*

*Enthusiasm is the sparkle in your eyes,  
the swing in your gait, the grip of your  
hand, the irresistible surge of will and  
energy to execute your ideas.*

*Enthusiasts are fighters. They have  
fortitude. They have staying qualities.*

***ENTHUSIASM** is at the bottom of all  
progress. With it there is  
accomplishment. Without it there are  
only alibis.”*

..... Henry Ford



# **ISO 3834:2005 Quality requirements for fusion welding of metallic materials**

## **ISO 14731:2006 Welding coordination – Tasks and responsibilities**

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WTIA TGN-3834-01 ISO 3834 Q&A Rev 0: Slide No. 3



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# Objective and Scope of the Expert Technology Tool (ETT)

- The aim of this ETT is to facilitate the adoption of ISO 3834 by Australian and New Zealand industry to create a globally competitive welding industry.
- WTIA recommends the adoption of this standard for all welding related manufacturing, fabrication, construction, repair and maintenance work.
- By introducing ISO 3834 the Client, designer, specifier, purchaser, fabricator and user of welded products will approach welding in the same systematic manner.
- Through this more systematic approach comes improved process management, increased customer satisfaction and a more competitive welding industry.

# 1. What is ISO 3834?

- It is an international standard created by welding professionals
- ISO 9001 provides the requirements for a quality management system; it does not establish requirements for products. ISO 3834 on the other hand, does provide the quality requirements for a welded product
- It specifies requirements relating only to the quality of the welded product
- It encourages a proactive process orientated approach to managing and controlling welding product quality in a workshop or on site
- It is also a Factory Control System to control activities for the manufacture of the product

## 2. Why adopt ISO 3834 when we have ISO 9001?

- ISO 9001 is a comprehensive standard that lays down quality management system requirements for any organisation
- ISO 9001 however, does not prescribe specific details for “special processes”. Welding is regarded as a “special process”.
- ISO 3834 was developed to identify all factors that could affect the quality of welded product and which need to be controlled at all stages, before, during and after welding.

### 3. What are the benefits of specifying the ISO 3834 Standard for the purchaser & specifier?

- More assurance of contract delivery dates
- Greater assurance of the quality of welded products
- Greater reliability and performance of plant
- Reduction in maintenance costs
- Reduction or elimination of third party inspection costs
- More competent suppliers of welded products



## 4. What are the benefits of using the ISO 3834 Standard for the manufacturer?

- Less rework
- Jobs completed on time
- Local and international recognition as a competent organisation
- Meet the welding-related requirements of ISO 9001
- More efficient coordination of welding activities
- More pro-active and responsible workforce
- Increased opportunities and capability to bid on jobs
- Cost savings – more efficient technology
- Reduced surveillance audits and inspections by purchasers with significant savings.

## 5. What are the benefits of using the ISO 3834 Standard for the individual employees?

- Helps to do the job more satisfactorily
- Greater job security
- Higher regard by other people
- Professional recognition
- Satisfied employer and customer
- More rewarding job position
- Develops team spirit

## 6. How important are welding personnel?

- A key feature of ISO 3834 is the requirement to ensure that people with welding responsibilities are competent to discharge those responsibilities
- This is achieved by incorporation of another standard, namely, ISO 14731 “Welding coordination – Tasks and responsibilities”
- The specifying of minimum requirements for personnel dealing with welding coordination and welding inspection personnel

## 7. What is the definition of a manufacturer?

- ISO 3834 defines a manufacturer as a 'person or organization responsible for the welding production'. The Standard uses this term to describe any such organisation, including manufacturing organisations supplying welding services, either for new products or for repair and maintenance, as well as other organisations where the application of the requirements of ISO 3834 are relevant
- A manufacturer may be involved in manufacture, fabrication, construction, repair or maintenance.

## 8. What are the types of manufacturing organisation that ISO 3834 can be applied to?

- Fabrication companies
- Construction companies - on-site work
- Repair and maintenance contractors
- Manufacturers of products
- Welding workshops on sites under the same technical and quality management
- Owners of plant with their own workshop(s)

## 9. What are the types of other organisation that ISO 3834 can be applied to?

Those which, though not creating welded product themselves, are specifying or requiring such work from others and are thus involved in weld design, contract development, and review of technical requirements and competencies of subcontractors e.g.:

- Asset owners without own workshops, both private and government
- Project management companies
- Design companies
- Consultants
- Government agencies

# 10. How many parts does ISO 3834 have?

ISO 3834: 2005 “Quality requirements for fusion welding of metallic materials” consists of 6 parts:

- ISO 3834-1:2005, Criteria for the selection of the appropriate level of quality requirements
- ISO 3834-2:2005, Comprehensive quality requirements
- ISO 3834-3:2005, Standard quality requirements
- ISO 3834-4:2005, Elementary quality requirements
- ISO 3834-5:2005, Applicable documentation (not full title)
- ISO/TR 3834-6:2007, Guidelines on implementing ISO 3834



# 11. How does ISO 3834 link in with ISO 9001?

- ISO 3834 does not replace ISO 9001 as a quality management system however it contains many attributes that will be important for a welding manufacturer, in both workshops and at field installation sites, seeking ISO 9001 certification
- Elements of ISO 9001 should be considered when implementing ISO 3834 quality requirements and seeking ISO 3834 certification
- The specific complementary elements of ISO 9001 are detailed in ISO 3834
- WTIA TGN-3834-06 2007 gives more detailed information

## 12. Describe how the flexibility of ISO 3834 can be applied?

ISO 3834 describes the following four situations where ISO 3834 can control welding:

- Case 1: To provide specific requirements in specifications which require the manufacturer to have a quality management system in accordance with ISO 9001:2000
- Case 2: To provide specific requirements in specifications which require the manufacturer to have a quality management system other than ISO 9001:2000
- Case 3: To provide specific guidance for a manufacturer developing a quality management system for fusion welding.
- Case 4: To provide detailed requirements for specifications, regulations or product standards that require control of fusion welding activities

# 13. What are the implications to satisfy Case 1: “To provide specific requirements in specifications which require the manufacturer to have a quality management system in accordance with ISO 9001:2000”

- **For the purchaser** - it implies that they want the manufacturer to have a quality management system in accordance with ISO 9001 and want to ensure that the supplier manages the quality of the product. To achieve this the purchaser must detail the requirements contained in ISO 3834 into the welding specification.
- **For the Manufacturer** - it implies that their quality management system must comply with ISO 9001 and that they need to meet the requirements of ISO 3834. . It is recommended that the supplier incorporates the requirements of ISO 3834 into their ISO 9001 quality management system using it as a ‘bolt on’ addition.



## 14. What are the implications to satisfy satisfy Case 2: “To provide specific requirements in specifications which require the manufacturer to have a quality management system other than ISO 9001:2000”

- **For the purchaser** - it implies that they want the manufacturer to have a quality management system but not necessarily in accordance with ISO 9001. Additionally the purchaser wants to ensure that the manufacturer manages the quality of the product. To achieve this the purchaser must detail the requirements contained in ISO 3834 into the welding specification or contract documents.
- **For the Manufacturer** - it implies that they must have a quality management system and meet the requirements of ISO 3834. It is recommended that the manufacturer adopts ISO 3834 and incorporate some elements from ISO 9001 to satisfy this requirement.

## 15. What are the implications to satisfy Case 3: “To provide specific guidance for a manufacturer developing a quality management system for fusion welding.”

- **For the purchaser** - it implies increased confidence in their supplier for its recognition of the importance of controlling the quality of the welded product
- **For the Manufacturer** - it implies that they recognise the importance of managing the quality of the product that they produce. To achieve this they need to use ISO 3834 as a set of guidelines to identify the key areas that need to be controlled. In addition it lists the elements of ISO 9001 that need to be considered when developing a quality management system.



## 16. What are the implications to satisfy Case 4: “To provide detailed requirements for specifications, regulations or product standards that require control of fusion welding activities”

- **For the purchaser and the Manufacturer** - it implies that there is an industry-wide recognition of the benefits that ISO 3834 has on the quality of welded products. This ISO 3834 Standard will be specified in specifications, regulations and product standards across all industry sectors such as pressure equipment, mining, building and construction, pipelines, railway etc. Therefore why not take advantage of these benefits now!



# 17. What are the main welding requirements covered in ISO 3834?

- **Review of requirements**
- **Technical review**
- **Subcontracting**
- **Welding personnel**
  - Welders and welding operators, Welding co-ordination personnel
- **Inspection & testing personnel**
  - Welding Inspection personnel; Non-destructive testing personnel
- **Equipment**
  - Production and testing equipment; Description of equipment; Suitability of equipment; New equipment; Equipment maintenance

# 17. What are the main welding requirements covered in ISO 3834 (cont'd)?

- **Welding and related activities**
  - Production planning; Welding procedure specifications (WPS); Qualification of the welding procedures; Work instructions; Procedures for preparation and control of documents
- **Welding Consumables**
  - Batch testing; Storage and handling
- **Storage of parent materials**
- **Post-weld heat treatment**

# 17. What are the main welding requirements covered in ISO 3834 (cont'd)?

- **Inspection and testing**
  - Inspection & testing before welding; Inspection & testing during welding; Inspection & testing after welding; Inspection & test status
- **Non-conformance and corrective actions**
- **Calibration and validation of measuring, inspection and testing equipment**
- **Identification & traceability**
- **Quality records**

# 18. How do purchasers select the appropriate part of ISO 3834 for a particular application?

A decision needs to be taken based on the following related to products:

- the extent and significance of safety-critical products
- the complexity of manufacture
- the range of products manufactured
- the range of different materials used
- the extent to which metallurgical problems may occur
- the extent to which manufacturing imperfections e.g. misalignment, distortion or weld imperfection, affect product performance

# 19. How do suppliers select the appropriate part of ISO 3834 for a particular application?

They need to consider, as a minimum, the following:

- How much welding is on-site or in a factory?
- How many welding processes does the company use?
- How many different materials are welded at the company?
- Are the materials readily weldable e.g. Gr 350 steel?
- Consequences of failure of the components ordered?
- Manufacturing or fabrication standard specified?
- How critical are the operating conditions of the component?

Then specify the appropriate part of ISO 3834.

# 20. How do we select the appropriate part of ISO 3834 for a particular application?

The Table below provides some guidance for selecting the appropriate part of ISO 3834:

| Element                          | ISO 3834-2<br>(comprehensive quality requirements)   | ISO 3834-3<br>(standard quality requirements) | ISO 3834-4<br>(elementary quality requirements) |
|----------------------------------|--|---|---|
| Review of requirements           | review required  |   |   |
|                                  | record is required   | record may be required                        | record is not required                          |
| Technical review                 | Review required  |   |   |
|                                  | record is required   | record may be required                        | record is not required                          |
| Sub-contracting                  | treat like a manufacturer for the specific subcontracted product, services and/or activities, however final responsibility for quality remains with the manufacturer |   |   |
| Welders and welding operators    | qualification is required  |   |   |
| Welding co-ordination personnel  | required   |   | no specific requirement                         |
| Inspection and testing personnel | qualification is required  |   |   |

## 20. How do we select the appropriate part of ISO 3834 for a particular application (cont'd)?

The Table below provides some guidance for selecting the appropriate part of ISO 3834:

| Element                                 | ISO 3834-2<br>(comprehensive quality requirements)   | ISO 3834-3<br>(standard quality requirements) | ISO 3834-4<br>(elementary quality requirements) |
|---|--|---|---|
| Production and testing equipment        | suitable and available as required for preparation, process execution, testing, transport, lifting in combination with safety equipment and protective clothes |   |   |
| Equipment maintenance                   | required to provide, maintain & achieve product conformity   |   | no specific requirement                         |
|   | documented plans and records are required  | documented plans and records are recommended  |   |
| Description of equipment                | List is required   |   | no specific requirement                         |
| Production planning                     | required   |   | no specific requirement                         |
|   | documented plans and records are required  | documented plans and records are recommended  |   |
| Welding procedure specifications        | required   |   | no specific requirement                         |
| Qualification of the welding procedures | required   |   | no specific requirement                         |

## 20. How do we select the appropriate part of ISO 3834 for a particular application (cont'd)?

The Table below provides some guidance for selecting the appropriate part of ISO 3834:

| Element                                     | ISO 3834-2<br>(comprehensive quality requirements)  | ISO 3834-3<br>(standard quality requirements) | ISO 3834-4<br>(elementary quality requirements) |
|---|---|---|---|
| Batch testing of consumables                | if required   |   | no specific requirement                         |
| Storage and handling of welding consumables | a procedure is required in accordance with supplier recommendations                                   |   | in accordance with supplier recommendations     |
| Storage of parent material                  | protection required from influence by environment; identification shall be maintained through storage |   | no specific requirement                         |
| Post-weld heat treatment                    | confirmation that the requirements according to product standard or specifications are fulfilled      |   | no specific requirement                         |
|   | procedure, record and traceability of the record to the product are required                          | procedure and record are required             |   |

## 20. How do we select the appropriate part of ISO 3834 for a particular application (cont'd)?

The Table below provides some guidance for selecting the appropriate part of ISO 3834:

| Element  | ISO 3834-2<br>(comprehensive quality requirements)  | ISO 3834-3<br>(standard quality requirements) | ISO 3834-4<br>(elementary quality requirements) |
|--|---|---|---|
| Inspection and testing before, during and after welding                  | required  |   | if required                                     |
| Non-conformance and corrective actions                                   | measures of control are implemented<br>procedures for repair and /or rectification are required |   | measures of control are implemented.            |
| Calibration or validation of measuring, inspection and testing equipment | required  | if required                                   | no specific requirement                         |
| Identification during process  | if required   |   | no specific requirement                         |
| Traceability   | if required   |   | no specific requirement                         |
| Quality records  | if required   |   |   |

# 21. Where does it state that welding coordination personnel are necessary?

**Clause 7.3 (ISO 3834.2:2005) states that:**

“The manufacturer shall have at his disposal appropriate welding coordination personnel. Such persons having responsibility for quality activities shall have sufficient authority to enable any necessary action to be taken. The tasks and responsibilities of such persons shall be clearly defined.”

- To fulfil this requirement it is necessary to conform to ISO 14731.

## 22. What does ISO 14731 state about welding coordination?

ISO 14731: 2006      Welding coordination - Tasks and responsibilities

- Welding is a special process which requires the coordination of welding operations in order to establish confidence in welding fabrication and reliable performance in service
- The tasks and responsibilities of personnel involved in welding related activities, e.g. planning, executing, supervising and inspection, should be clearly defined.

## 23. In ISO 14731 what are the key welding coordination tasks & responsibilities that need to be defined and allocated?

- The Table below shows these. A company can select or add where appropriate.

|  |   |
|--|---|
| Review of Requirements<br>Technical Review<br>Subcontracting<br>Welding Personnel<br>Equipment<br>Production Planning<br>Qualification of the Welding Procedures<br>Welding Procedure Specifications<br>Work Instructions<br>Welding Consumables | Materials<br>Inspection and Testing Before Welding<br>Inspection and Testing During Welding<br>Inspection and Testing After Welding Post-weld<br>Heat Treatment<br>Non-conformance and Corrective Actions<br>Calibration and Validation of Measuring,<br>Inspection and Testing Equipment<br>Identification and Traceability<br>Quality Records |
|--|---|

## 24. Who are welding coordination personnel?

- Personnel who have responsibilities in the manufacturing operation for welding and welding related activities and whose competence and knowledge has been demonstrated by e.g. training, education and/or relevant manufacturing experience.
- Such personnel have to have tasks and responsibilities allocated to them e.g. welding supervisor, storeman, design engineer, contracts engineer
- WTIA has established training programmes for all these personnel
- WTIA TGN-3834-05 2007 gives more detailed information

## 25. What level of competency and technical knowledge is required to be a welding coordinator?

- **To be competent to perform the tasks, the welding coordinator should have the experience, training and/or qualification to:**
  - Understand the tasks he/she is responsible for
  - Be competent to perform them adequately
  - Accept the responsibility and if necessary, be re-trained
- **Adequate technical knowledge is required to enable the allocated tasks to be performed satisfactorily:**
  - General technical knowledge
  - Specialised technical knowledge relevant to the assigned tasks

## 26. What is the scope of the welding coordinator's responsibilities?

- The position and responsibilities of each person for welding coordination tasks should be clearly identified
- For assigned tasks, the extent of authorisation including authority to sign on behalf of the manufacturing organisation should be clearly spelled out
- The company shall nominate at least one Responsible Welding Coordinator (ISO 14731, Clause 4.2)

# 27. What are the duties of the Responsible Welding Coordinator (RWC)?

## Responsible Welding Coordinator must:

- Be competent to make decisions and sign on behalf of the manufacturer
- Be authorised with the overall responsibility for monitoring welding activities as well as taking action when welding has not been correctly performed, and could also be responsible for the work of other welding coordinators on the same site or in the same department In large organisations with different products or sites there may be more than one RWC

RWC could be added to his/her normal job title and function, e.g. Technical Manager; Quality Manager; Production Manager

## 28. How can I obtain guidance on this?

WTIA TGN-3834-05 should be consulted for:

- Table 1 – Welding-related activities
- Table 2 – Welding coordination activities and responsibilities to ISO 14731:2006 and  
Self Assessment Checklist
- Table 3 – Welding coordination activities and responsibilities to ISO 14731:2006 Task  
Allocation Checklist

## 29. What levels of knowledge and technical qualifications need to be considered before appointing Responsible Welding Coordination personnel to carry out specific responsibilities?

ISO 14731 recommends the following:

- Comprehensive technical knowledge
  - **International Welding Engineer (IWE)**
- Specific technical knowledge
  - **International Welding Technologist (IWT)**
- Basic technical knowledge
  - **International Welding Specialist (IWS)**

Equivalent national qualifications of a similar standard may be acceptable. WTIA has implemented a significant strategy to review, update and make existing Australian qualifications integrated with the international norms.

## 30. What are the existing number of qualified Australian & NZ Personnel?

Unfortunately when compared to our competitors in the developed countries our numbers of qualified personnel are relatively low. The present numbers of International Qualified Personnel at 31 August 2007 were:

| Australia |           | New Zealand |
|-----------|-----------|-------------|
| IWE 17    | IWI C 40  | IWS 18      |
| IWT 28    | IWI S 188 | IWI S 4     |
| IWS 332   |           |             |
| IWP 293   |           |             |

WTIA has launched a major initiative to improve these numbers significantly to alleviate the skills shortage. It has also introduced training programmes throughout Australia and New Zealand conducted either by WTIA or selected IIW ATBs. Visit our website [www.wtia.com.au](http://www.wtia.com.au) or email [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au) to obtain details of training course venues, costs, dates etc.

# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel?

WTIA recommends the following, where appropriate (see also WTIA TGN-3834-04 “How to specify training and qualifications of welding coordination personnel”)

## **International Welding Engineer (IWE)**

- Training can now take place by distance education through the WTIA IIW Approved Training Body (ATB) and then be examined for IWE by the WTIA IIW Authorised National Body (ANB).

# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel (cont'd)?

## International Welding Engineer (IWE) (cont'd)

- The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which people can have their qualifications and experience evaluated by WTIA as the IIW ANB and the people may then take the examinations for IWE via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA).
- Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWE examinations.

# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel (cont'd)?

## International Welding Technologist (IWT)

- Training can now take place by distance education through the WTIA IIW Approved Training Body (ATB) and then be examined for IWT by the WTIA IIW Authorised National Body (ANB).
- The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which people can have their qualifications and experience evaluated by WTIA as the IIW ANB and the people may then take the examinations for IWT via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA)
- Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWT examinations.



# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel (cont'd)?

## International Welding Specialist (IWS)

WTIA offers the following three training and qualification routes in Australia and New Zealand through training at ATBs and examination by the WTIA IIW ANB.

- IIW International Welding Specialist
- IIW International Welding Specialist incorporating WTIA Welding Supervisor AS 1796 Certificate 10 for Pressure Equipment Applications
- IIW International Welding Specialist incorporating WTIA Welding Supervisor to AS 2214 for Structural Steel Applications

# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel (cont'd)?

## **International Welding Specialist (IWS) (con't)**

Some people may have non-WTIA qualifications as welding supervisors issued by TAFEs, private training providers, etc. The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which such people can have their qualifications and experience evaluated by WTIA as the IIW Authorised National Body (ANB) and the people may then take the examinations for IWS via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA). Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWS examinations.



# 31. What are the WTIA recommended minimum qualifications for Welding Coordination Personnel (cont'd)?

## International Welding Specialist (IWS) (con't)

TAFE SA Elizabeth Campus is IIW approved to deliver International Welding Specialist training via Distance Education. The course includes a two-week attendance block on campus in Adelaide.



## 32. Where do the AS 1796 Certificate 10 Welding Supervisor and AS 2214 Welding Supervisor fit in with ISO 3834?

WTIA TGN-3834-05 gives examples of what activities might be allocated to the Welding Supervisor under the overall responsibility of the Responsible Welding Coordinator (RWC). Such Welding Supervisors should be encouraged to continue their training to achieve International Welding Specialist (IWS), the minimum recommended qualification in ISO 14731 and ISO 3834 for a RWC. It is also recommended that companies accept only WTIA Certificated Welding Supervisors to control such supervisory activities. Other types of welding supervisors can be evaluated and examined by WTIA.

# 33. What are the WTIA recommended minimum qualifications for Inspection Personnel?

WTIA offers the following three qualification routes in Australia through training at IIW Approved Training Bodies (ATBs)

International Welding Inspector - Comprehensive Level  
incorporating WTIA Comprehensive Welding Inspector

International Welding Inspector - Standard Level  
incorporating WTIA Senior Welding Inspector

International Welding Inspector - Basic Level  
incorporating WTIA Welding Inspector

*Note: The existing WTIA Welding Inspector has been renamed WTIA Certified Senior Welding Inspector and a new lower level WTIA Certified Welding Inspector introduced.*



# 33. What are the WTIA recommended minimum qualifications for Inspection Personnel (cont'd)?

WTIA recommends the following as guidance in line with ISO 3834 Part 5 (Annex A).

## **Welding Inspectors**

IIW International Welding Inspector Comprehensive Level incorporating WTIA Comprehensive Welding Inspector and appropriate experience

IIW International Welding Inspector Standard Level incorporating WTIA Certified Senior Welding Inspector and appropriate experience



# 33. What are the WTIA recommended minimum qualifications for Inspection Personnel (cont'd)?

Some people may have overseas certification to CSWIP or AWS. WTIA evaluates CSWIP Senior Welding Inspector (CSWIP 3.2) and AWS Senior Certified Welding Inspector (SCWI) with some additional requirements as comparable to the IIW IWI Standard level and WTIA Senior Welding Inspector; and CSWIP Welding Inspector (CSWIP 3.1) and AWS Certified Welding Inspector (CWI) at the IIW International Welding Inspector Basic level.



# 34. How can you become an International Welding Specialist or International Welding Inspector Standard Level?

- There are now a number of WTIA International Institute of Welding (IIW) Approved Training Bodies (TAFEs and one private training organisation) in Australia, as well as HERA in NZ where employees may obtain their IWS or IWI S training
- Some companies may appoint coordinators who have no qualifications, insufficient qualifications or qualifications not obtained through WTIA. To give purchasers and end users confidence in such people's competency, it is recommended that such personnel, apply for evaluation by WTIA to undertake additional training and/or the appropriate WTIA IIW examinations

# 35. What are the WTIA recommended minimum qualifications for NDT Inspection Personnel?

ISO 3834 specifies that NDT personnel should be certificated to a national program complying with ISO 9712. It is recommended that Australian companies ensure that NDT technicians comply with the appropriate certifications for NDT method, level of certifications and specific application to the following national programs, i.e. :

- Australian Institute for Non Destructive Testing (AINDT)
- South African Qualification and Certification Committee for NDT (SAQCC/NDT)
- Certification Scheme for Welding Inspection Personnel (CSWIP) UK
- Certification Board for Inspection Personnel (CBIP) NZ

It is also recommended that company certifications to the American Society of Non-destructive Testing (ASNT) programme SNT-TC-1A are not accepted



# 36. How will personnel obtain certification to be able to give employers or purchasers more confidence that they are competent?

For IWE, IWT and IWS qualified personnel IIW has introduced a programme for:

- Certified International Welding Engineer
- Certified International Welding Technologist
- Certified International Welding Specialist

Contact WTIA for more information.

# 36. How will personnel obtain certification to be able to give employers or purchasers more confidence that they are competent (cont'd)?

IIW is still debating the introduction of an IIW Certification Programme for Welding Inspectors. If it does not, for IWI C, IWI S and IWI B WTIA will introduced a:

- WTIA Certified International Welding Inspector Comprehensive Level incorporating WTIA Comprehensive Welding Inspector
- WTIA Certified International Welding Inspector Standard Level incorporating WTIA Certified Senior Welding Inspector (the old WTIA Welding Inspector certification)
- WTIA Certified International Welding Inspector Basic Level incorporating WTIA Certified Welding Inspector (new level)



# 37. How can you find a list of IWE, IWT, IWS, IWI C, IWI S, IWI B, Welding Inspectors, Welding Supervisors or Welders to AS 1979 Certificates 1-9?

You can visit WTIA's website [www.wtia.com.au](http://www.wtia.com.au) where WTIA maintains a list of names of people who qualified through IIW and WTIA and from 2008 a list of certified people who have maintained their certification as a measure of competency through WTIA



## 38. What are the WTIA recommended minimum qualifications for practical Welding Personnel?

Clause 2.1 (ISO 3834-5:2005) states, “To claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4, a manufacturer is required to conform either to the ISO documents listed in 2.2 (e.g. ISO 9606) or to other documents that provide technically equivalent conditions, when these documents are referenced in the product standards for the products being made by the manufacturer”;  
and;



## 38. What are the WTIA recommended minimum qualifications for practical Welding Personnel (cont'd)?

“It is the responsibility of the manufacturer to demonstrate technically equivalent conditions when documents other than those specified in 2.2 are employed. Certificates issued following assessment by independent certification organizations, or claims of compliance by a manufacturer with any part of ISO 3834, shall clearly identify the documents used by the manufacturer.”



## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer?

A manufacturer should include the following, amongst other activities, in any self assessment. Assistance may be obtained by referring to the WTIA TGN-3834-07 “Self assessment of quality requirements - Checklist and action plan”. Examples are given below.

- The organisation shall nominate its Responsible Welding Coordinator and show he/she is appropriately qualified and empowered
- The manufacturing organisation shall demonstrate that a review of requirements and a technical review has been carried out considering as a minimum the items referred to in ISO ISO 3834:2 or .3
- All welding related activities and services subcontracted under this contract shall fully comply with ISO 3834.2 or .3



## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- The manufacturing organisation shall provide documentation to demonstrate that welders and welding operators are qualified to the standard specified
- The manufacturing organisation shall demonstrate that welding coordination personnel have been nominated and have clearly defined tasks and responsibilities
- The manufacturing organisation shall provide documentation to demonstrate that non-destructive testing personnel are certificated to ISO 9712

## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- The manufacturing organisation shall ensure that plant and equipment are suitable and available as required for preparation, process execution, testing, transport, lifting in combination with safety equipment and protective clothes
- Prior to placing the contract the manufacturing organisation shall provide to the Client for review, a description of the equipment intended to be used on this contract. This list should include equipment capacity and capability

## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- The manufacturing organisation shall provide a documented production plan considering as a minimum the items referred to in ISO 3834.2 or .3
- The manufacturing organisation shall provide documented weld procedure specifications in accordance with the standard specified. Prior to production the weld procedures shall be qualified in accordance with the appropriate part of the standard specified

## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- The manufacturing organisation shall demonstrate that a system is in place to control quality documentation such as weld procedure specifications, weld procedure approval records and welder approval certificates
- The manufacturing organisation shall provide a written procedure for the control of welding consumables to ensure compliance with the manufacturer's specification
- Material shall be identified and stored in such a manner that the material and its identification will not be adversely affected

## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- Where post-weld heat treatment is required, the manufacturer shall provide a written procedure, a record and traceability of the record to the product demonstrating process conformity
- The manufacturing organisation shall demonstrate that a system is in place to control inspection and testing prior to, during and after welding
- A system shall be in place to demonstrate maintenance of calibration or validation of measuring, inspection and testing equipment used to assesses the quality of the welded construction

## 39. How should ISO 3834.2 or .3 be assessed by a manufacturer (cont'd)?

- A written procedure for controlling non-conforming product shall be agreed with the Client prior to production
- The manufacturing organisation and the Client shall consider ISO 3834 and agree on the requirements for, batch testing of consumables, identification and traceability and quality records

## 40. Is it necessary to obtain ISO 3834 certification?

- No, it is not mandatory to obtain either ISO 3834 or ISO 9001 certification
- Obtaining certification, however, from an accredited third party enables the manufacturing organisation to independently demonstrate compliance. This can result in a purchaser reducing the number of surveillance audits
- It is possible to achieve ISO 3834 certification alone or combined in ISO 9001 but be careful how this is done when combined with ISO 9001
- Certification obtained through the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication gives a manufacturer true global recognition and purchasers' increased confidence in the certification

# 41. What is the process for obtaining ISO 3834 certification?

**Step1:** The manufacturing organisation, in consultation with its customer, reviews the customer's products and requirements and decides on which of the three levels of quality requirements of ISO 3834 i.e. comprehensive, standard or basic, is appropriate. If in doubt, the WTIA is available for advice.



# 41. What is the process for obtaining ISO 3834 certification? (cont'd)

**Step 2:** Establish and implement a welding management system to ISO 3834. WTIA TGN-3834-07 “Self assessment of quality requirements - Checklist and action plan” is available to guide you through this process.



## 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 3:** Request an application form and information pack from WTIA (e-mail [a.cantero@wtia.com.au](mailto:a.cantero@wtia.com.au))
- **Step 4:** Complete the application form and return it and evidence of any existing certification to WTIA PO Box 6165 Silverwater, NSW, 1811

## 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 5:** Based on the information in the application form, a quotation will be sent to the organisation by WTIA
- **Step 6:** On receipt of the order from the company by WTIA, it will appoint the Assessment Team to carry out an assessment
- **Step 7:** The Lead Assessor sends the appropriate WTIA Form 3834 Document Review to the Fabricator.

# 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 8:** The Fabricator completes the Document Review Form and submits this together with the Quality Management documentation to the WTIA appointed Assessor, who then carries out a preliminary visit followed by a further review.
- **Step 9:** An on-site audit by the appointed Lead Assessor(s) is conducted

# 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 10:** Part of the audit involves an interview with the Responsible Welding Coordinator. One of the criteria for an acceptable RWC is qualification, and the recommended qualifications are IWE, IWT or International Welding Specialist (IWS) in accordance with the International Institute of Welding. Other equivalent qualifications would be considered during the interview stage. If the RWC does not have such a qualification, then someone else within the Manufacturer must, even if that person is an outside Contractor. There must be a direct link between the Contractor and the Manufacturer.

## 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 11:** The initial assessment report, a review of any corrective actions and a final report are submitted to the WTIA WFCS Manager
- **Step 12:** Once the manufacturer has demonstrated compliance to ISO 3834 a certificate from the International Institute of Welding (IIW) for acceptance in the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication will be issued indicating the standard(s) against which certification has been achieved.

# 41. What is the process for obtaining ISO 3834 certification? (cont'd)

- **Step 13:** Surveillance will be carried out annually to demonstrate ongoing compliance
- **Step 14:** Reassessment against ISO 3834 will be required every five years



## 42. What is the process for obtaining ISO 9001 and ISO 3834 certification?

WTIA recommends that when you are ready to either apply for certification to ISO 9001 or are to undergo an audit to re-approve your ISO 9001 that it is wise to consider also applying for ISO 3834 certification, and suggests you take the following steps:



## 42. What is the process for obtaining ISO 9001 and ISO 3834 certification (cont'd)?

**Step 1:** Inform the company undertaking your ISO 9001 certification (approval or re-approval) that you wish to undertake a single assessment or audit involving both that company and WTIA to obtain two certifications to ISO 9001 and ISO 3834. The company should be aware that whereas an ISO 9001 audit looks mainly at Tier 1 Quality Management System documents, an ISO 3834 audit concentrates on Tier 2 and 3 documents and consequently, takes at least two days on site. Also, such companies should also be accredited against EA-6/02 “EA Guidelines on the Use of EN 45 011 and EN 45 012 for Certification to EN 729” to issue certification against ISO 3834.

## 42. What is the process for obtaining ISO 9001 and ISO 3834 certification? (cont'd)

**Step 2:** Go to Step 3 shown in Question 37 above

**Step 3:** Make contact with WTIA through email [a.cantero@wtia.com.au](mailto:a.cantero@wtia.com.au) or Tel: 02 9748 4443 and WTIA will contact you to make further arrangements.

**Step 4:** Your own company, the ISO 9001 certification body and WTIA will coordinate the mutually agreed dates to conduct the joint single audit. The ISO 9001 audit may finish before the ISO 3834 audit. All other steps will be as shown in Section 4 below, with Steps 9 and 10 being coordinated on a similar basis.

## 42. What is the process for obtaining ISO 9001 and ISO 3834 certification? (cont'd)

Important Note: It is important that the company performing the ISO 9001 certification does not persuade you to by-pass the above advice and issue you with its own “ISO 3834 certification” unless it is accredited to do so. WTIA can advise on this.

In Europe, companies conducting an ISO 3834 assessment or audit must be accredited to EA-6/02 EA “Guidelines on the use of EN45011 and EN45012 for Certification to EN729” (EN729 is now EN ISO 3834). The IIW has improved this by implementing these Guidelines as Rules and integrating them into the Rules described in the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication.

## 42. What is the process for obtaining ISO 9001 and ISO 3834 certification? (cont'd)

In Australia and New Zealand, purchasers will question the qualifications and experience of the assessors being used to audit you to ISO 3834. This is the reason why the WTIA personnel used are all International Welding Engineers (IWE) or International Welding Technologists (IWT) or equivalent and approved by TWI UK as ISO 3834 Lead Assessors.



## 43. What is the cost to obtain ISO 3834 certification?

Final costs are dependent upon particular circumstance but for guidance the following estimates are provided:

- Certification A\$8,500 (excluding travel and accommodation)
- Surveillance A\$1,000 per annum (excluding travel and accommodation)



## 44. How do you obtain ISO 3834 recognition without certification?

- Establish and implement ISO 3834 into the organisation
- Self assess your organization using the WTIA ETT TGN-3834 Parts 1-7 for guidance
- Use WTIA to undertake a second party audit on your behalf to provide additional
- assurance and independent recognition of compliance to ISO 3834 so that you can go
- forward to certification with confidence

## 45. How can a Client verify compliance with their manufacturing organisation's ISO 3834 system?

- Insist in the Client's welding specification or contract documents that the manufacturer is certificated to the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication by an accredited third party organisation. TGN-3834-03 gives more information on this.
- Carry out a second party audit using:
  - suitably qualified personnel from within the Client's organisation or
  - Use WTIA on your behalf to provide additional assurance and independent recognition of compliance to ISO 3834

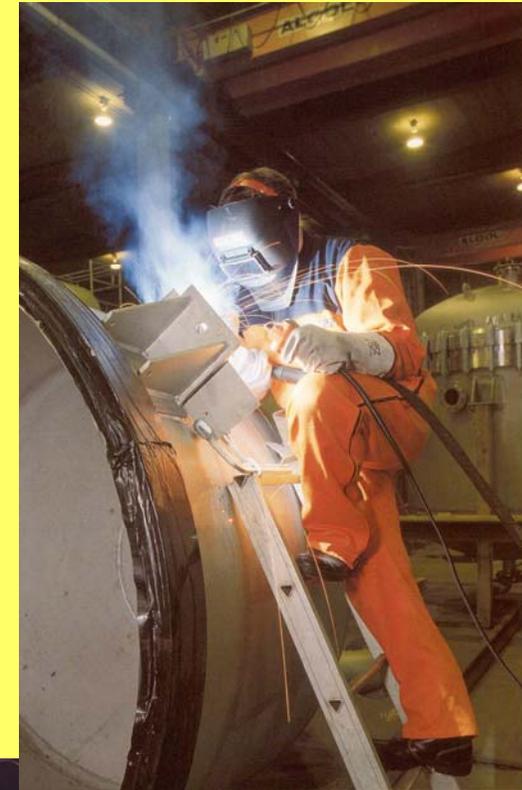
**International Institute of Welding**  
*A world of joining experience*

***With the three attributes of***

- ENTHUSIASM***
- PERSISTENCE and***
- COOPERATION,***

***we can all work together  
in an excellent team  
effort to improve the quality  
of life globally***

**CHRIS SMALLBONE**  
**President IIW 2005-2008**



TGN-3834-02  
***Questions and Answers:  
Word Document***

*This information is also available as a PowerPoint presentation (TGN-3834-01) in  
Adobe Acrobat format which can be viewed in the 'full screen' mode  
and used as a projection for teaching purposes*

## Scope

The aim of this Technical Guidance Note is to facilitate the adoption of ISO 3834:2005 "Quality requirements for fusion welding of metallic materials" by Australian and New Zealand industry to create a globally competitive welding industry. WTIA recommends the adoption of this Standard for all welded fabrication, construction, repair and maintenance work. By introducing ISO 3834 the client, designer, specifier, purchaser, fabricator and user of welded products will approach welding in the same systematic manner. Through this more systematic approach comes improved process management, increased customer satisfaction and a more competitive welding industry

This is the second of seven WTIA Technical Guidance Notes making up an Expert Technology Tool (TGN-3834-01 to 07) for industry on the benefits and application of ISO 3834:2005 and ISO 14731:2006 "Welding coordination - Tasks and responsibilities". A Power Point presentation of this material is available as TGN-3834-01. Detailed explanatory information on the two standards is given in the WTIA ETT and ISO 3834 Part 6.

Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

Q 1 What is ISO 3834?

- A 1
- It is an international Standard created by welding professionals
  - ISO 9001 provides the requirements for a quality management system; it does not establish requirements for products. ISO 3834 on the other hand, does provide the quality requirements for a welded product
  - It specifies requirements relating only to the quality of the welded product
  - It encourages a proactive process orientated approach to managing and controlling welding product quality in a workshop or on site
  - It is also a Factory Control System to control activities for the manufacture of the product

Q 2 Why adopt ISO 3834 when we have ISO 9001?

- A 2
- ISO 9001 is a comprehensive system and lays down requirements for Quality Management Systems for any organisation
  - ISO 9001 however, does not prescribe specific details for "special processes". Welding is regarded as a "special process".
  - ISO 3834 was developed to identify all factors that could affect the quality of welded product and which need to be controlled at all stages, before, during and after welding.

Q 3 What are the benefits of specifying the ISO 3834 Standard for the purchaser and specifier?

- A 3
- More assurance of contract delivery dates
  - Greater assurance of the quality of welded products
  - Greater reliability and performance of plant
  - Reduction in maintenance costs
  - Reduction or elimination of third party inspection costs
  - More competent suppliers of welded products

Q 4 What are the benefits of using the ISO 3834 Standard for the manufacturer?

- A 4
- Less rework
  - Jobs completed on time
  - Local and international recognition as a competent organisation
  - Meet the welding-related requirements of ISO 9001
  - More efficient coordination of welding activities

- More pro-active and responsible workforce
  - Increased opportunities and capability to bid on jobs
  - Cost savings – more efficient technology
  - Reduced surveillance audits and inspections by purchasers with significant savings.
- Q 5 What are the benefits of using the ISO 3834 Standard for individual employees?
- A 5
- Helps to do the job more effectively
  - Greater job security
  - Higher regard by other people
  - Professional recognition
  - Satisfied employer and customer
  - More rewarding job satisfaction
  - Develops team spirit
- Q 6 How important are welding personnel?
- A 6
- A key feature of ISO 3834 is the requirement to ensure that people with welding responsibilities are competent to discharge those responsibilities
  - This is achieved by incorporation of another Standard, namely, ISO 14731:2006 “Welding coordination – Tasks and responsibilities” and,
  - The specifying of minimum requirements for personnel dealing with welding coordination and welding inspection personnel
- Q7 What is the definition of a manufacturer?
- A7
- ISO 3834 defines a manufacturer as a ‘person or organization responsible for the welding production’. The Standard uses this term to describe any such organisation, including manufacturing organisations supplying welding services, either for new products or for repair and maintenance, as well as other organisations where the application of the requirements of ISO 3834 are relevant
  - A manufacturer may be involved in manufacture, fabrication, construction, repair or maintenance.
- Q 8 What are the types of manufacturing organisation that ISO 3834 can be applied to?
- A 8
- Fabrication companies
  - Construction companies - on-site work
  - Repair and maintenance contractors
  - Manufacturers of products
  - Welding workshops on sites under the same technical and quality management
  - Owners of plant with their own workshop(s)
- Q9 What are the types of other organisations that ISO 3834 can be applied to?
- A9
- Those which, though not creating welded product themselves, are specifying or requiring such work from others and are thus involved in weld design, contract development, and review of technical requirements and competencies of subcontractors e.g.
- Asset owners without own workshops, both private and government
  - Project management companies
  - Design companies
  - Consultants
  - Government agencies
- Q 10 How many parts does ISO 3834 have?
- A 10
- ISO 3834: 2005 “Quality requirements for fusion welding of metallic materials” consists of 6 parts:
- ISO 3834-1:2005, Criteria for the selection of the appropriate level of quality requirements
  - ISO 3834-2:2005, Comprehensive quality requirements
  - ISO 3834-3:2005, Standard quality requirements
  - ISO 3834-4:2005, Elementary quality requirements
  - ISO 3834-5:2005, Applicable documentation (not full title)
  - ISO/TR 3834-6:2007, Guidelines on implementing ISO 3834

Q 11 How does ISO 3834 link in with ISO 9001

- A 11
- ISO 3834 does not replace ISO 9001 as a quality management system however it contains many attributes that will be important for a welding manufacturer, in both workshops and at field installation sites, seeking ISO 9001 certification
  - Elements of ISO 9001 should be considered when implementing ISO 3834 quality requirements and seeking ISO3834 certification
  - The specific complementary elements of ISO 9001 are detailed in ISO 3834
  - WTIA TGN-3834-06 2007 gives more detailed information

Q 12 Describe how the flexibility of ISO 3834 can be applied?

A 12 ISO 3834 describes the following four situations where ISO 3834 can control welding:

- Case 1: To provide specific requirements in specifications which require the manufacturer to have a quality management system in accordance with ISO 9001:2000
- Case 2: To provide specific requirements in specifications which require the manufacturer to have a quality management system other than ISO 9001:2000
- Case 3: To provide specific guidance for a manufacturer developing a quality management system for fusion welding.
- Case 4: To provide detailed requirements for specifications, regulations or product standards that require control of fusion welding activities

Q 13 What are the implications to satisfy Case 1: “To provide specific requirements in specifications which require the manufacturer to have a quality management system in accordance with ISO 9001:2000”

A 13 **For the purchaser** – it implies that they want the manufacturer to have a quality management system in accordance with ISO 9001 and want to ensure that the supplier manages the quality of the product. To achieve this the purchaser must detail the requirements contained in ISO 3834 into the welding specification or contract documents

**For the manufacturer** – it implies that their quality management system must comply with ISO 9001 and that they need to meet the requirements of ISO 3834. . It is recommended that the supplier incorporates the requirements of ISO 3834 into their ISO 9001 quality management system by using it as a ‘bolt on’ addition.

Q 14 What are the implications to satisfy Case 2: “To provide specific requirements in specifications which require the manufacturer to have a quality management system other than ISO 9001:2000”

A 14 **For the purchaser** - it implies that they want the manufacturer to have a quality management system but not necessarily in accordance with ISO 9001. Additionally the purchaser wants to ensure that the manufacturer manages the quality of the product. To achieve this the purchaser must detail the requirements contained in ISO 3834 into the welding specification or contract documents.

**For the manufacturer** – it implies that they must have a quality management system and meet the requirements of ISO 3834. It is recommended that the manufacturer adopts ISO 3834 and incorporate some elements from ISO 9001 to satisfy this requirement.

Q 15 What are the implications to satisfy Case 3: “To provide specific guidance for a manufacturer developing a quality management system for fusion welding.”

A 15 **For the purchaser** - it implies increased confidence in their supplier for its recognition of the importance of controlling the quality of the welded product

**For the manufacturer** – it implies that they recognise the importance of managing the quality of the product that they produce. To achieve this they need to use ISO 3834 as a set of guidelines to identify the key areas that need to be controlled. In addition it lists the elements of ISO 9001 that need to be considered when developing a quality management system.

- Q 16 What are the implications to satisfy Case 4: “To provide detailed requirements for specifications, regulations or product standards that require control of fusion welding activities”
- A 16 **For the purchaser and the manufacturer** - it implies that there is an industry-wide recognition of the benefits that ISO 3834 has on the quality of welded products. This ISO 3834 Standard will be specified in specifications, regulations and product or application standards across all industry sectors such as pressure equipment, mining, building and construction, pipelines, railways etc. Therefore why not take advantage of these benefits now!
- Q 17 What are the main welding requirements covered in ISO 3834?
- A 17 Main headings in ISO 3834.2 are:
- Review of requirements
  - Technical review
  - Sub-contracting
  - Welding personnel
    - Welders and welding operators
    - Welding co-ordination personnel
  - Inspection & testing personnel
    - Welding inspection personnel
    - Non-destructive testing personnel
  - Equipment
    - Production and testing equipment
    - Description of equipment
    - Suitability of equipment
    - New equipment
    - Equipment maintenance
  - Welding and related activities
    - Production planning
    - Welding procedure specifications (WPS)
    - Qualification of the welding procedures
    - Work instructions
    - Procedures for preparation and control of documents
  - Welding Consumables
    - Batch testing
    - Storage and handling
  - Storage of parent materials
  - Post-weld heat treatment
  - Inspection & testing
    - Inspection & testing before welding; Inspection & testing during welding; Inspection & testing after welding; Inspection & test status
  - Non-conformance and corrective actions
  - Calibration and validation of measuring, inspection and testing equipment
  - Identification & traceability
  - Quality records
- Q 18 How do purchasers select the appropriate part of ISO 3834 for a particular application?
- A 18 A decision needs to be taken based on the following, related to products:
- the extent and significance of safety-critical products
  - the complexity of manufacture
  - the range of products manufactured
  - the range of different materials used
  - the extent to which metallurgical problems may occur
  - the extent to which manufacturing imperfections e.g. misalignment, distortion or weld imperfection, affect product performance

Q 19 How do suppliers select the appropriate part of ISO 3834 for a particular application?

A 19 They need to consider, as a minimum, the following:

- How much welding is on-site or in a factory?
- How many welding processes does the company use?
- How many different materials are welded at the company?
- Are the materials readily weldable e.g. Gr 350 steel?
- Consequences of failure of the components ordered?
- Manufacturing or fabrication standard specified?
- How critical are the operating conditions of the component?

Then specify the appropriate part of ISO 3834.

Q 20 How do we select the appropriate part of ISO 3834 for a particular application?

A 20 The Table below provides some guidance for selecting the appropriate part of ISO 3834:

| Element  | ISO 3834-2<br>(comprehensive quality requirements)   | ISO 3834-3<br>(standard quality requirements) | ISO 3834-4<br>(elementary quality requirements) |
|--|--|---|---|
| Review of requirements   | review required  |   |   |
|  | record is required   | record may be required                        | record is not required                          |
| Technical review   | Review required  |   |   |
|  | record is required   | record may be required                        | record is not required                          |
| Sub-contracting  | treat like a manufacturer for the specific subcontracted product, services and/or activities, however final responsibility for quality remains with the manufacturer |   |   |
| Welders and welding operators  | qualification is required  |   |   |
| Welding co-ordination personnel  | required   |   | no specific requirement                         |
| Inspection and testing personnel   | qualification is required  |   |   |
| Production and testing equipment   | suitable and available as required for preparation, process execution, testing, transport, lifting in combination with safety equipment and protective clothes       |   |   |
| Description of equipment   | list is required   |   | no specific requirement                         |
| Equipment maintenance  | required to provide, maintain & achieve product conformity   |   | no specific requirement                         |
|  | documented plans and records are required  | documented plans and records are recommended  |   |
| Production planning  | required   |   | no specific requirement                         |
|  | documented plans and records are required  | documented plans and records are recommended  |   |
| Welding procedure specifications   | required   |   | no specific requirement                         |
| Qualification of the welding procedures                                  | required   |   | no specific requirement                         |
| Batch testing of consumables   | if required  |   | no specific requirement                         |
| Storage and handling of welding consumables                              | a procedure is required in accordance with supplier recommendations  |   | in accordance with supplier recommendations     |
| Storage of parent material   | protection required from influence by environment; identification shall be maintained through storage  |   | no specific requirement                         |
| Post-weld heat treatment   | confirmation that the requirements according to product standard or specifications are fulfilled   |   | no specific requirement                         |
|  | procedure, record and traceability of the record to the product are required   | procedure and record are required             |   |
| Inspection and testing before, during and after welding                  | required   |   | if required                                     |
| Non-conformance and corrective actions                                   | measures of control are implemented<br>procedures for repair and /or rectification are required  |   | measures of control are implemented.            |
| Calibration or validation of measuring, inspection and testing equipment | required   | if required                                   | no specific requirement                         |
| Identification during process  | if required  |   | no specific requirement                         |
| Traceability   | if required  |   | no specific requirement                         |
| Quality records  | if required  |   |   |

Q 21 Where does it state that welding coordination personnel are necessary?

A 21 Clause 7.3 (ISO 3834.2:2005) states that:

“The manufacturer shall have at his disposal appropriate welding coordination personnel. Such persons having responsibility for quality activities shall have sufficient authority to enable any necessary action to be taken. The tasks and responsibilities of such persons shall be clearly defined.”

To fulfil this requirement it is necessary to conform to ISO 14731.

Q 22 What does ISO 14731 state about welding coordination?

A 22 ISO 14731:2006 Welding coordination - Tasks and responsibilities

- Welding is a special process which requires the coordination of welding operation in order to establish confidence in welding fabrication and reliable performance in service
- The tasks and responsibilities of personnel involved in welding related activities, e.g. planning, executing, supervising and inspection, should be clearly defined.

Q 23 In ISO 14731 what are the key welding coordination tasks & responsibilities that need to be defined and allocated?

A 23 The Table below shows these. A Company can select or add where appropriate.

|   |   |
|---|---|
| Review of Requirements                  | Materials   |
| Technical Review                        | Inspection and Testing Before Welding                                     |
| Subcontracting                          | Inspection and Testing During Welding                                     |
| Welding Personnel                       | Inspection and Testing After Welding Post-weld Heat Treatment             |
| Equipment                               | Non-conformance and Corrective Actions                                    |
| Production Planning                     | Calibration and Validation of Measuring, Inspection and Testing Equipment |
| Qualification of the Welding Procedures | Identification and Traceability   |
| Welding Procedure Specifications        | Quality Records   |
| Work Instructions                       |   |
| Welding Consumables                     |   |

Q 24 Who are welding coordination personnel?

- A 24
- Personnel who have responsibilities in the manufacturing operation for welding and welding related activities and whose competence and knowledge has been demonstrated by e.g. training, education and/or relevant manufacturing experience.
  - Such personnel have to have tasks and responsibilities allocated to them e.g. welding supervisor, storeman, design engineer, contracts engineer
  - WTIA has established training programmes for all these personnel
  - WTIA TGN-3834-05 2007 gives more detailed information

Q 25 What level of competency and technical knowledge is required to be a welding coordinator?

- A 25
- To be competent to perform the tasks, the welding coordinator should have the experience, training and/or qualification to:
    - Understand the tasks he/she is responsible for
    - Be able to perform them adequately
    - Accept the responsibility and if necessary, be re-trained
  - Adequate technical knowledge is required to enable the allocated tasks to be performed satisfactorily:
    - General technical knowledge
    - Specialised technical knowledge relevant to the assigned tasks

Q 26 What is the scope of the welding coordinator's responsibilities?

- A 26
- The position and responsibilities of each person for welding coordination tasks should be clearly identified
  - For assigned tasks, the extent of authorisation including authority to sign on behalf of the manufacturing organisation should be clearly spelled out

- The company shall nominate at least one Responsible Welding Coordinator (ISO 14731, Clause 4.2)

Q 27 What are the duties of the Responsible Welding Coordinator (RWC)?

A 27 The Responsible Welding Coordinator must:

- Be competent to make decisions and sign on behalf of the manufacturer
- Be authorised with the overall responsibility for monitoring welding activities as well as taking action when welding has not been correctly performed, and could be also responsible for the work of other welding coordinators on the same site or in the same department

In large organisations with different products or sites there may be more than one RWC

RWC could be added to his/her normal job title and function, e.g.

- Technical Manager
- Quality Manager
- Production Manager

Q 28 How can I obtain guidance on this?

A 28 WTIA TGN-3834-05 should be consulted for:

- Table 1 – Welding-related activities
- Table 2 – Welding coordination activities and responsibilities to ISO 14731:2006 and Self Assessment Checklist
- Table 3 – Welding coordination activities and responsibilities to ISO 14731:2006 Task Allocation Checklist

Q 29 What levels of knowledge and technical qualifications need to be considered before appointing Responsible Welding Coordination personnel to carry out specific responsibilities?

A 29 ISO 14731 recommends the following:

- Comprehensive technical knowledge
  - **International Welding Engineer (IWE)**
- Specific technical knowledge
  - **International Welding Technologist (IWT)**
- Basic technical knowledge
  - **International Welding Specialist (IWS)**

Equivalent national qualifications of a similar standard may be acceptable.

WTIA has implemented a significant strategy to review, update and make existing Australian qualifications integrated with the international norms.

Q 30 What are the existing number of qualified Australian Personnel?

A 30 Unfortunately when compared to our competitors in the developed countries our numbers of qualified personnel are relatively low. The present numbers of International Qualified Personnel in Australia and New Zealand at 31 August 2007 are:

| Australia |     | New Zealand |    |
|-----------|-----|-------------|----|
| IWE       | 17  |             |    |
| IWT       | 28  |             |    |
| IWS       | 332 | IWS         | 18 |
| IWP       | 293 |             |    |
| IWI C     | 40  |             |    |
| IWI S     | 188 | IWI S       | 4  |

WTIA has launched a major initiative to improve these numbers significantly to alleviate the skills shortage. It has also introduced training programmes throughout Australia and New Zealand conducted either by WTIA or selected IIW ATBs. Visit our website [www.wtia.com.au](http://www.wtia.com.au) or email [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au) to obtain details of training course venues, costs, dates etc.

- Q 31 What are the WTIA recommended minimum qualifications for Welding Coordination Personnel?
- A 31 WTIA recommends the following, where appropriate (see also WTIA TGN-3834-04 "How to specify training and qualifications of welding coordination personnel")

#### **International Welding Engineer (IWE)**

- Training can now take place by distance learning through the WTIA IIW Approved Training Body (ATB) and then be examined for IWE by the WTIA IIW Authorised National Body (ANB).
- The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which people can have their qualifications and experience evaluated by WTIA as the IIW ANB and the people may then take the examinations for IWE via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA). Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWE examinations.

#### **International Welding Technologist (IWT)**

- Training can now take place by distance learning through the WTIA IIW Approved Training Body (ATB) and then be examined for IWT by the WTIA IIW Authorised National Body (ANB).
- The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which people can have their qualifications and experience evaluated by WTIA as the IIW ANB and the people may then take the examinations for IWT via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA). Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWT examinations.

#### **International Welding Specialist (IWS)**

WTIA offers the following three training and qualification routes in Australia and New Zealand through training at IIW ATBs and examination by the WTIA IIW ANB.

- IIW International Welding Specialist
- IIW International Welding Specialist incorporating WTIA Welding Supervisor AS 1796 Certificate 10 for Pressure Equipment Applications
- IIW International Welding Specialist incorporating WTIA Welding Supervisor to AS 2214 for Structural Steel Applications

Some people may have non-WTIA qualifications as welding supervisors issued by TAFEs, private training providers, etc. The IIW through WTIA has a "Recognition of Prior Learning (RPL)" route by which such people can have their qualifications and experience evaluated by WTIA as the IIW Authorised National Body (ANB) and the people may then take the examinations for IWS via the "Alternative Route", with or without additional training, at the discretion of the IIW ANB (i.e. WTIA). Such a route involves submission and assessment of the required paperwork for evaluation and, at the discretion of the IIW ANB, some combination of a professional interview and/or technical project and/or technical interview leading to recommended appropriate training if any, all prior to sitting the IWS examinations.

TAFE SA Elizabeth Campus is IIW approved to deliver International Welding Specialist training via Distance Education. The course includes a two-week attendance block on campus in Adelaide.

Q 32 Where do the AS 1796 Certificate 10 Welding Supervisor and AS 2214 Welding Supervisor fit in with ISO 3834?

A 32 WTIA TGN-3834-05 gives examples of what activities might be allocated to the Welding Supervisor under the overall responsibility of the Responsible Welding Coordinator (RWC). Such Welding Supervisors should be encouraged to continue their training to achieve International Welding Specialist (IWS), the minimum recommended qualification in ISO 14731 and ISO 3834 for a RWC. It is also recommended that companies accept only WTIA Certificated Welding Supervisors to control such supervisory activities. Other types of welding supervisors can be evaluated and examined by WTIA.

Q 33 What are the WTIA recommended minimum qualifications for Inspection Personnel?

A 33 WTIA recommends the following, as guidance:

WTIA offers the following three qualification routes in Australia through training at IIW Approved Training Bodies (ATBs)

- IIW International Welding Inspector - Comprehensive Level incorporating WTIA Comprehensive Welding Inspector
- International Welding Inspector - Standard Level incorporating WTIA Senior Welding Inspector
- International Welding Inspector - Basic Level incorporating WTIA Welding Inspector

*Note: The existing WTIA Welding Inspector has been renamed WTIA Certified Senior Welding Inspector and a new lower level WTIA Certified Welding Inspector introduced.*

WTIA recommends the following as guidance in line with ISO 3834 Part 5 (Annex A).

#### **Welding Inspectors**

- IIW International Welding Inspector Comprehensive Level incorporating WTIA Comprehensive Welding Inspector and appropriate experience
- IIW International Welding Inspector Standard Level incorporating WTIA Certified Senior Welding Inspector and appropriate experience
- Some people may have overseas certification to CSWIP or AWS. WTIA evaluates CSWIP Senior Welding Inspector (CSWIP 3.2) and AWS Senior Certified Welding Inspector (SCWI) with some additional requirements as comparable to the IIW IWI Standard level and WTIA Senior Welding Inspector; and CSWIP Welding Inspector (CSWIP 3.1) and AWS Certified Welding Inspector (CWI) at the IIW International Welding Inspector Basic level.

Q 34 How can you become an International Welding Specialist or International Welding Inspector Standard Level?

A 34

- There are now a number of WTIA International Institute of Welding (IIW) Approved Training Bodies (TAFEs and one private training organisation) in Australia, as well as HERA in NZ where employees may obtain their IWS or IWI S training
- Some companies may appoint coordinators who have no qualifications, insufficient qualifications or qualifications not obtained through WTIA. To give purchasers and end users confidence in such people's competency, it is recommended that such personnel, apply for evaluation by WTIA under the Alternative Route to undertake additional training and/or the appropriate WTIA or IIW examinations

Q 35 What are the WTIA recommended minimum qualifications for NDT Inspection Personnel?

A 35 ISO 3834 specifies that NDT personnel should be certificated to a national program complying with ISO 9712. It is recommended that Australian companies ensure that NDT technicians comply with the appropriate certifications for NDT method, level of certifications and specific application to the following national programs, i.e. :

- Australian Institute for Non-Destructive Testing (AINDT)
- South African Qualification and Certification Committee for NDT (SAQCC(NDT))
- Certification Scheme for Welding Inspection Personnel (CSWIP) UK
- Certification Board for Inspection Personnel (CBIP) NZ

It is also recommended that company certifications to the American Society of Non-destructive Testing (ASNT) programme SNT-TC-1A are not accepted.

Q 36 How will personnel obtain certification to be able to give employers or purchasers more confidence that they are competent?

A 36 For IWE, IWT and IWS qualified personnel IIW has introduced a programme for:

- Certified International Welding Engineer
- Certified International Welding Technologist
- Certified International Welding Specialist

IIW is still debating the introduction of an IIW Certification Programme for Welding Inspectors. If it does not, for IWI C, IWI S and IWI B WTIA will introduced a:

- WTIA Certified International Welding Inspector Comprehensive Level incorporating WTIA Comprehensive Welding Inspector
- WTIA Certified International Welding Inspector Standard Level incorporating WTIA Certified Senior Welding Inspector (the old WTIA Welding Inspector certification)
- WTIA Certified International Welding Inspector Basic Level incorporating WTIA Certified Welding Inspector (new level)

Contact WTIA for more information.

Q 37 How can you find a list of IWE, IWT, IWS, IWI C, IWI S, IWI B, Welding Inspectors, Welding Supervisors or Welders to AS 1979 Certificates 1-9?

A 37 You can visit WTIA's website [www.wtia.com.au](http://www.wtia.com.au) where WTIA maintains a list of names of people who qualified through IIW and WTIA and from 2008 a list of certified people who have maintained their certification as a measure of competency through WTIA

Q 38 What are the WTIA recommended minimum qualifications for practical Welding Personnel?

A 38 Clause 2.1 (ISO 3834-5:2005) states, "To claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4, a manufacturer is required to conform either to the ISO documents listed in 2.2 (e.g. ISO 9606) or to other documents that provide technically equivalent conditions, when these documents are referenced in the product standards for the products being made by the manufacturer" and,

"It is the responsibility of the manufacturer to demonstrate technically equivalent conditions when documents other than those specified in 2.2 are employed. Certificates issued following assessment by independent certification organizations, or claims of compliance by a manufacturer with any part of ISO 3834, shall clearly identify the documents used by the manufacturer."

Q 39 How should ISO 3834.2 or .3 be assessed by a manufacturer?

A 39 A manufacturer could include the following, amongst other activities, in any self assessment. Assistance may be obtained by referring to the WTIA TGN-3834-07 "Self assessment of quality requirements - Checklist and action plan". Some examples are given below:

- The organisation shall nominate its Responsible Welding Coordinator and show he/she is appropriately qualified and empowered
- The manufacturing organisation shall demonstrate that a review of requirements and a technical review has been carried out considering as a minimum the items referred to in ISO ISO 3834:2 or .3
- All welding related activities and services subcontracted under this contract shall fully comply with ISO 3834:2 or .3
- The manufacturing organisation shall provide documentation to demonstrate that welders and welding operators are qualified to the standard specified
- The manufacturing organisation shall demonstrate that welding coordination personnel have been nominated and have clearly defined tasks and responsibilities
- The manufacturing organisation shall provide documentation to demonstrate that non-destructive testing personnel are certificated to ISO 9712
- The manufacturing organisation shall ensure that plant and equipment are suitable and available as required for preparation, process execution, testing, transport, lifting in combination with safety equipment and protective clothes

- Prior to placing the contract the manufacturing organisation shall provide to the Client for review, a description of the equipment intended to be used on this contract. This list should include equipment capacity and capability
- The manufacturing organisation shall provide a documented production plan considering as a minimum the items referred to in ISO 3834.2 or .3
- The manufacturing organisation shall provide documented weld procedure specifications in accordance with the standard specified.
- Prior to production the weld procedures shall be qualified in accordance with the appropriate part of the standard specified
- The manufacturing organisation shall demonstrate that a system is in place to control quality documentation such as weld procedure specifications, weld procedure approval records and welder approval certificates
- The manufacturing organisation shall provide a written procedure for the control of welding consumables to ensure compliance with the manufacturer's specification
- Material shall be identified and stored in such a manner that the material and its identification will not be adversely affected
- Where post-weld heat treatment is required, the manufacturer shall provide a written procedure, a record and traceability of the record to the product demonstrating process conformity
- The manufacturing organisation shall demonstrate that a system is in place to control inspection and testing prior to, during and after welding
- A system shall be in place to demonstrate maintenance of calibration or validation of measuring, inspection and testing equipment used to assesses the quality of the welded construction
- A written procedure for controlling and rectifying non-conforming product shall be agreed with the Client prior to production
- The manufacturing organisation and the Client shall agree on the requirements for, batch testing of consumables, identification and traceability, and quality records

Q 40 Is it necessary to obtain ISO 3834 certification?

- A 40
- No, it is not mandatory to obtain either ISO 3834 or ISO 9001 certification
  - Obtaining certification, however, from an accredited third party enables the manufacturing organisation to independently demonstrate compliance. This can result in a purchaser reducing the number of surveillance audits
  - It is possible to achieve ISO 3834 certification alone or combined in ISO 9001 but be careful how this is done when combined with ISO 9001
  - Certification obtained through the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication gives a manufacturer true global recognition and purchasers' increased confidence in the certification

Q 41 What is the process for obtaining ISO 3834 certification?

A 41

- Step 1:** The manufacturing organisation, in consultation with its customer, reviews the customer's products and requirements and decides on which of the three levels of quality requirements of ISO 3834 i.e. comprehensive, standard or basic, is appropriate. If in doubt, the WTIA is available for advice.
- Step 2:** Establish and implement a welding management system to ISO 3834. WTIA TGN-3834-07 "Self assessment of quality requirements - Checklist and action plan" is available to guide you through this process.
- Step 3:** Request an application form and information pack from WTIA (e-mail a.cantero@wtia.com.au)
- Step 4:** Complete the application form and return it and evidence of any existing certification to WTIA PO Box 6165 Silverwater, NSW, 1811
- Step 5:** Based on the information in the application form, a quotation will be sent to the organisation by WTIA
- Step 6:** On receipt of the order from the company by WTIA, it will appoint the Assessment Team to carry out an assessment

- Step 7:** The Lead Assessor sends the appropriate WTIA Form 3834 Document Review to the Fabricator.
- Step 8:** The Fabricator completes the Document Review Form and submits this together with the Quality Management documentation to the WTIA appointed Assessor, who then carries out a preliminary visit followed by a further review.
- Step 9:** An on-site audit by the appointed Lead Assessor(s) is conducted
- Step 10:** Part of the audit involves an interview with the Responsible Welding Coordinator. One of the criteria for an acceptable RWC is qualification, and the recommended qualifications are IWE, IWT or International Welding Specialist (IWS) in accordance with the International Institute of Welding. Other equivalent qualifications would be considered during the interview stage. If the RWC does not have such a qualification, then someone else within the Manufacturer must, even if that person is an outside Contractor. There must be a direct link between the Contractor and the Manufacturer.
- Step 11:** The initial assessment report, a review of any corrective actions and a final report are submitted to the WTIA WFCS Manager
- Step 12:** Once the manufacturer has demonstrated compliance to ISO 3834 a certificate from the International Institute of Welding (IIW) for acceptance in the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication will be issued indicating the standard(s) against which certification has been achieved.
- Step 13:** Surveillance will be carried out annually to demonstrate ongoing compliance
- Step 14:** Reassessment against ISO 3834 will be required every five years

Q 42 What is the process for obtaining ISO 9001 and ISO 3834 certification?

A 42 WTIA recommends that when you are ready to either apply for certification to ISO 9001 or are to undergo an audit to re-approve your ISO 9001 that it is wise to consider also applying for ISO 3834 certification, and suggests you take the following steps:

- Step 1:** Inform the company undertaking your ISO 9001 certification (approval or re-approval) that you wish to undertake a single assessment or audit involving both that company and WTIA to obtain two certifications to ISO 9001 and ISO 3834. The company should be aware that whereas an ISO 9001 audit looks mainly at Tier 1 Quality Management System documents, an ISO 3834 audit concentrates on Tier 2 and 3 documents and consequently, takes at least two days on site. Also, such companies should also be accredited against EA-6/02 "EA Guidelines on the Use of EN 45 011 and EN 45 012 for Certification to EN 729" to issue certification against ISO 3834.
- Step 2:** Go to Step 3 shown in Question 37 above
- Step 3:** Make contact with WTIA through email [a.cantero@wtia.com.au](mailto:a.cantero@wtia.com.au) or Tel: 02 9748 4443 and WTIA will contact you to make further arrangements.
- Step 4:** Your own company, the ISO 9001 certification body and WTIA will coordinate the mutually agreed dates to conduct the joint single audit. The ISO 9001 audit may finish before the ISO 3834 audit All other steps will be as shown in Section 4 below, with Steps 9 and 10 being coordinated on a similar basis.

You may decide that you are quite happy to undertake certification to ISO 3834 completely separately from ISO 9001. If so, simply follow Section 3 above.

**Important Note:** It is important that the company performing the ISO 9001 certification does not persuade you to by-pass the above advice and issue you with its own "ISO 3834 certification" unless it is accredited to do so. WTIA can advise on this.

In Europe, companies conducting an ISO 3834 assessment or audit must be accredited to EA-6/02 EA "Guidelines on the use of EN45011 and EN45012 for Certification to EN729" (EN729 is now EN ISO 3834). The IIW has improved this by implementing these Guidelines as Rules and integrating them into the Rules described in the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication.

In Australia and New Zealand, purchasers will question the qualifications and experience of the assessors being used to audit you to ISO 3834. This is the reason why the WTIA personnel used are all International Welding Engineers (IWE) or International Welding Technologists (IWT) or equivalent and approved by TWI UK as ISO 3834 Lead Assessors.

Q 43 What is the cost to obtain ISO 3834 certification?

A 43 Final costs are dependent upon particular circumstances but for guidance the following estimates are provided:

- Certification A\$8,500 (excluding travel and accommodation)
- Surveillance A\$1,000 per annum (excluding travel and accommodation)

Q 44 How do you obtain ISO 3834 recognition prior to certification?

A 44

- Establish and implement ISO 3834 into the organisation
- Self assess your organization using the WTIA ETT TGN-3834 Parts 01-07 for guidance
- Use WTIA to undertake a second party audit on your behalf to provide additional assurance and independent recognition of compliance to ISO 3834 so that you can go forward to certification with confidence

Q 45 How can a Client verify compliance with their manufacturer's ISO 3834 system?

A 45

- Insist in the Client's welding specification or contract documents that the manufacturer is certificated to the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication by an accredited third party organisation. TGN-3834-03 gives more information on this.
- Carry out a second party audit using:
  - suitably qualified personnel from within the Client's organisation or
  - Use WTIA on your behalf to provide additional assurance and independent recognition of compliance to ISO 3834

**Acknowledgment:** WTIA wishes to acknowledge the contribution of Technology Expert Group members and WTIA SMART Industry Sector Groups: Building and Construction, Defence, Mining, Pressure Equipment, Rail, Road Transport, Water, Medical Devices and Sensors, Pipelines, Power Generation, Alumina Processing and Petro/Chemical.

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TGN-3834-03

***How to Specify ISO 3834:2005  
Quality requirements for fusion  
welding of metallic materials:  
Example from  
Alcoa World Alumina Australia***

## 1 Scope

The purpose of this document is to advise the purchaser, owner, user, designer or specifier on what they should include in their specification to cover welding and to ensure that the contractor meets the requirements of ISO 3834:2005 and provides a quality product. By doing this, the 'Client' is stipulating that the contractor (i.e. manufacturer, constructor, fabricator, maintainer or repairer) must have:

- systems and processes in place to suitably manage welding operations
- competent people to undertake key welding tasks and responsibilities
- facilities and equipment that are able to deliver the contract

In accordance with ISO 3834, a Manufacturer is defined as a 'person or organisation responsible for the welding production'. The Standard uses this term to describe any such organisation involved in manufacturing, fabrication, construction, repair or maintenance as well as other organisations such as asset owners, project management and design companies where the requirements of ISO 3834 are applicable to activities such as weld design, contract development, and the review of technical requirements and competencies of subcontractors.

This is the third of seven WTIA Technical Guidance Notes making up an Expert Technology Tool (TGN-3834-01 to 07) for industry on the benefits and application of ISO 3834:2005 and ISO 14731:2006 "Welding coordination - Tasks and responsibilities". A Power Point presentation of this material is available as TGN-3834-01. Detailed explanatory information on the two standards is given in the WTIA ETT and ISO 3834 Part 6.

Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

## 2 Recommended Technical Support/Engineering Standard from Alcoa World Alumina Australia for use in a Client's Welding Specification or Contract Document

WTIA SMART Industry Group member Alcoa World Alumina Australia has produced a Technical Support/Engineering Standard entitled:

AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA) :  
Compliance to ISO 3834: 2005 "Quality Requirements for Fusion Welding of Metallic Materials" and ISO 14731: 2006 Welding Coordination – Tasks and Responsibilities

Alcoa World Alumina Australia has agreed that WTIA can incorporate this standard within this Expert Technology Tool, and that other companies can freely use it to generate their own documentation.

Key points in the standard include:

- Table 1 gives examples of selecting the appropriate level of ISO 3834 for different equipment groups.
- Suppliers need to have their documented quality system showing a clear direction for achieving compliance and certification to ISO 3834: 2005 by 1<sup>st</sup> August 2009.
- The Supplier shall hold certification to the IIW Manufacturers Certification Scheme (MCS) by 1<sup>st</sup> August 2010.
- Welding Inspection personnel should meet the requirements in Annex A of ISO 3834:2005, Part 5 and the WTIA Certification Programmes for Welding Inspection Personnel, which are linked to IIW qualifications, International Welding Inspector Basic (IWI B) and Standard (IW S) levels.
- The Supplier shall have a Responsible Welding Coordinator in accordance with ISO 14731:2006 with specific reference to Annex A of ISO 14731:2006 (recommended International Welding Engineer (IWE), Technologist (IWT) or Specialist (IWS)).

A copy of this Technical Support/Engineering Standard is attached as pages 2 to 9 of this ETT.

**Acknowledgment:** WTIA wishes to acknowledge the contribution of Alcoa World Alumina Australia and the following Technology Expert Group members and WTIA SMART Industry Sector Groups: Building and Construction, Defence, Mining, Pressure Equipment, Rail, Road Transport, Water, Medical Devices and Sensors, Pipelines, Power Generation, Alumina Processing and Petro/Chemical.

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**AWASTD620 - ISO 3834 and ISO 14731  
Quality Requirements for Equipment Welding  
(AWA)**

**Compliance to ISO 3834: 2005 “Quality  
Requirements for Fusion Welding of Metallic  
Materials” and ISO 14731: 2006 Welding  
Coordination – Tasks and Responsibilities**



# AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)

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# AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)

## 1.0 Foreword

Welding quality for manufacture of the equipment specified is critical. Welding is a special process where the final result cannot be categorically verified by testing. The quality of the welding must be manufactured into the product during manufacture and not solely inspected into the product. Therefore, welding requires continuous control and the use of specific procedures. This Standard deals with the quality requirements in welding that are critical for the contract. In essence, the Supplier shall have:

- Systems and processes in place to manage welding operations.
- Competent people to undertake key welding tasks and responsibilities.
- Facilities and equipment that is able to deliver a quality product per the contract.

It is intended that this Standard will be provided as an attachment with specifications for the manufacture of welded equipment.

## 2.0 Definitions

For the purposes of this Standard the following definitions apply:

|          |  |
|----------|--|
| Alcoa    | Representatives of Alcoa World Alumina, AWA        |
| Supplier | The company or person who fabricates the equipment |
| Shall    | Means a requirement that the Supplier must satisfy |
| Will     | Means a requirement that Alcoa must satisfy        |
| May      | Means a requirement is optional                    |
| IIW      | International Institute of Welding                 |
| MCS      | Manufacturer Certification Scheme, of the IIW      |
| WTIA     | Welding Technology Institute of Australia          |
| TGN      | Technical Guidance Note, of the WTIA               |

## 3.0 Referenced Documents

ISO 3834: 2005 Quality requirements for fusion welding of metallic materials –

Part 1: Criteria for the selection of the appropriate level of quality requirements

Part 2: Comprehensive quality requirements

Part 3: Standard quality requirements

Part 4: Elementary quality requirements

Part 5: Documents with which it is necessary to conform to claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4

Part 5, Corrigendum 1: as above

Part 6: Guidelines on implementing ISO 3834

## **AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)**

ISO 14731: 2006 Welding coordination – Tasks and responsibilities

TGN-3834 Expert Technology Tool – ISO 3834:2005 Quality requirements for fusion welding of metallic materials, Benefits and Implementation. Published by the WTIA on the following URL: <http://www.wtia.com.au/pdf/TGN-3834-FULL%20SET.pdf>.

### **4.0 Requirement for ISO 3834 Compliance**

The Supplier shall use and demonstrate that its welding management system complies with ISO 3834: 2005 “Quality Requirements for Fusion Welding of Metallic Materials”. Specifically, the Supplier shall comply with one of the following three; ISO 3834: 2005 Part 2, ISO 3834: 2005 Part 3, or ISO 3834: 2005 Part 4.

Note that the contents of ISO 3834: 2005 Parts 1, 5, and 6 shall be used for reference as applicable.

### **5.0 Selection of ISO 3834 Quality Level**

The final selection of quality level (“ISO 3834 Part 2 Comprehensive”, “ISO3834 Part 3 Standard”, or “ISO 3834 Part 4 Elementary”) will be specified by Alcoa. The Supplier shall obtain confirmation of the selected quality level prior to the commencement of manufacture.

For selection of quality level, Alcoa will use appropriate engineering judgement in making a final selection, taking all business, safety and environmental risks into account for the equipment being manufactured. Table 1 on the next page provides examples of sensible welding level selections for a number of different equipment groups.

The selection criteria listed in ISO 3834: 2005, Part 1 will be consulted whenever selections are being made.

If no selection of level is provided by Alcoa then the “Comprehensive” Quality Level per ISO 3834 Part 2 shall be used.

# AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)

**TABLE 1: Examples of Welding Level Selections**

*Note: Final selection will be specified by Alcoa taking all business, safety and environmental risks into account*

| Equipment Group  | Minimum Quality Level | Applicable Part of ISO 3834: 2005 |
|--|-----------------------|-----------------------------------|
| Boilers, Water tube or Fire tube.  | Comprehensive         | Part 2                            |
| Unfired Pressure Vessels & Heat Exchangers   | Comprehensive         | Part 2                            |
| All Atmospheric Pressure Tanks   | Comprehensive         | Part 2                            |
| Cranes, Hoists, Lifting Equipment  | Comprehensive         | Part 2                            |
| Pressure piping – containing steam, combustible gas, lethal gas, and highly corrosive and toxic fluids | Comprehensive         | Part 2                            |
| Pressure Piping – lower hazard   | Standard              | Part 3                            |
| Structural Steel, Platforms, Handrails, Stairs, and Ladders  | Standard              | Part 3                            |
| Structures/Equipment subject to fatigue loadings (e.g. Stackers, Reclaimers, Grinding Mills...)        | Comprehensive         | Part 2                            |
| Brackets (e.g. For field instruments)  | Standard              | Part 3                            |
| Office and Storage Shelving  | Standard              | Part 3                            |
| Mobile equipment, except ROPS <sup>(1)</sup> & FOPS <sup>(2)</sup>                                     | Standard              | Part 3                            |
| ROPS <sup>(1)</sup> & FOPS <sup>(2)</sup> on mobile equipment  | Comprehensive         | Part 2                            |

(1) ROPS = Roll Over Protection System

(2) FOPS = Falling Object Protection System

## AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)

### 6.0 Requirement for ISO 14731 Welding Coordination Compliance

As specified in ISO 3834: 2005, the Supplier shall coordinate welding related operations through a Responsible Welding Coordinator having qualifications, tasks and responsibilities defined by the Supplier and in accordance with ISO 14731: 2006. For qualifications, specific reference is made to Annex A of ISO 14731: 2006.

### 7.0 Welding Procedure and Welder Qualification

ISO 3834: 2005 makes reference to other ISO standards with respect to welding procedure qualification and welder qualification<sup>(1)</sup>. For the equipment specified the requirements and standards as referenced in the equipment specification shall take precedence.

*(1) Welder qualification in this Section relates to the requirement of design codes that welding personnel prove competence to perform specific welds using an appropriate test.*

### 8.0 Post Weld Heat Treatment

ISO 3834: 2005 makes reference to other ISO standards with respect to post weld heat treatment. For the equipment specified, requirements and standards as referenced in the equipment specification shall take precedence.

### 9.0 Inspection and Testing

ISO 3834: 2005 makes reference to other ISO standards with respect to inspection and testing. For the equipment specified, requirements and standards as referenced in the equipment specification shall take precedence.

For the qualification and education requirements of welding inspection personnel, refer to Annex A of ISO 3834: 2005, Part 5, and the WTIA Certification Programmes for Welding Inspection Personnel.

### 10.0 Pre-Qualification to ISO 3834

Before contract commencement the Supplier will be pre-qualified by Alcoa to supply the equipment specified. For this pre-qualification, the Supplier shall make manufacturing facilities available so an assessment can be made of the capability of meeting all requirements of this Standard and providing the specified product on time per the contract schedule. Pre-qualification will be carried out by Alcoa using the services of an audit team or person acceptable to Alcoa. In most cases, this will be done using the services of the WTIA or its overseas affiliates as appropriate. Pre-qualification will involve a combination of questionnaire, document audit, and quality/technical audit of the facilities that will be used for manufacture of the specified equipment.

## AWASTD620 - ISO 3834 and ISO 14731 Quality Requirements for Equipment Welding (AWA)

### 11.0 Certification and Documentation of ISO 3834 Quality System

Certification to ISO 3834: 2005 provides independent recognition of the Supplier's capability to manage its welding activities and demonstrate its commitment to deliver quality welded products. Certification is available via the IIW and its MCS. In Australia, it is anticipated that the WTIA will obtain authorisation by the IIW to carry out certification assessments and issue ISO 3834 certification. Large numbers of Australian manufacturer's have already achieved such certification.

The Supplier's quality system shall be documented showing a clear direction for achieving compliance and certification to ISO 3834: 2005; however the requirement for documentation is waived until 1<sup>st</sup> August 2009 in order to provide a development period.

For manufacture of the equipment specified, the Supplier shall hold certification to ISO 3834: 2005; however this requirement is waived until 1<sup>st</sup> August 2010 in order to provide a development period. During this interim period, Alcoa requires pre-qualification per Section 10.0 above as a minimum.

### 12.0 Technical Assistance

The WTIA has indicated a commitment to assist Suppliers with deployment of ISO 3834: 2005. To this end, a TGN has been developed by the WTIA with the assistance of industry. This is available from the WTIA homepage on the link below:

Link/URL to WTIA homepage:

<http://www.wtia.com.au/>

Link/URL to TGN 3834; 2007:

<http://www.wtia.com.au/pdf/TGN-3834-FULL%20SET.pdf>



**AWASTD620 - ISO 3834 and ISO 14731  
Quality Requirements for Equipment Welding  
(AWA)**

**EDITION UPDATE INFORMATION**

| <b>Version No.</b> | <b>Issue Date</b> | <b>Change Details</b> | <b>Change by</b> |
|--------------------|-------------------|-----------------------|------------------|
| 1                  | 050508            | First Issue           | R. West          |
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|                    |                   |                       |                  |

TGN-3834-04

***How to specify training  
and qualifications of  
welding coordination personnel***

TGN-3834-05  
***How to specify tasks and  
responsibilities for  
Welding Coordinators to  
ISO 14731:2006***

## **1. Scope**

ISO 3834:2005 'Quality requirements for fusion welding of metallic materials' defines the various approaches to quality requirements in welded fabrication, construction and maintenance through the implementation of competent welding co-ordination. In Parts 2 and 3, paragraph 7.3 (of each standard), it states that "the manufacturer shall have at his disposal appropriate welding coordination personnel". Such personnel are defined in ISO Standard 14731:2006 'Welding coordination – Tasks and responsibilities' Section 4.2 'Specification of tasks and responsibilities' which also refers to Annex B. Section 4.2 states that "The manufacturer shall appoint at least one responsible welding coordinator". Section 6.2 defines the specific knowledge requirements of responsible welding coordination personnel and refers to Annex A.

The International Welding Engineer (IWE), International Welding Technologist (IWT) and International Welding Specialist (IWS) are the recommended minimum requirements for education, examination and qualification of welding coordination personnel. This is shown in Annex A in ISO 14731:2006 and Annex A in ISO 3834-5:2005 where minimum requirements for inspection personnel are also stated.

The purpose of this WTIA Note is to guide a manufacturing organisation on how to specify the tasks and responsibilities of Welding Coordination Personnel to comply with ISO 3834:2005. A manufacturing organisation may be a company involved in fabrication, construction, repair or maintenance as a supplier of services, or an asset owner, purchaser, project manager etc.

The Note includes a welding coordination activities and responsibilities Self-assessment Checklist (Table 2) and Task Allocation Checklist (Table 3,) based on activities and responsibilities detailed in ISO 14731 as tools for use by manufacturing organisations.

In accordance with ISO 3834, a Manufacturer is defined as a 'person or organisation responsible for the welding production'. The Standard uses this term to describe any such organisation involved in manufacturing, fabrication, construction, repair or maintenance as well as other organisations such as asset owners, project management and design companies where the requirements of ISO 3834 are applicable to activities such as weld design, contract development, and the review of technical requirements and competencies of subcontractors.

This is the fifth of seven WTIA Technical Guidance Notes making up an Expert Technology Tool (TGN-3834-01 to 07) for industry on the benefits and application of ISO 3834:2005 and ISO 14731:2006 "Welding coordination - Tasks and responsibilities". A Power Point presentation of this material is available as TGN-3834-01. Detailed explanatory information on the two standards is given in the WTIA ETT and ISO 3834 Part 6.

Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

## **2. Benefits of Welding Coordination**

### **2.1 For the Manufacturer**

- less rework
- jobs completed on time
- local and international recognition as a competent organisation
- meet the welding-related requirements of ISO 9001
- more efficient coordination of welding activities
- more pro-active and responsible work force
- increase opportunities and capability to bid on jobs
- cost savings - more efficient technology
- Reduced surveillance audits and inspections by purchasers with significant savings.

## **2.2 For the purchaser and specifier**

- reduction in maintenance costs
- more assurance of contract delivery dates
- greater assurance of the quality of the welded product
- greater reliability and performance of plant
- reduction or elimination of third party inspection costs
- more competent suppliers of welded products

## **2.3 To the individual**

- helps to do the job more satisfactorily
- greater job security
- higher regard by other people
- professional recognition
- satisfied employer and customer
- more rewarding job position
- develop team spirit

## **3. Welding Coordination Personnel**

### **3.1 Introduction**

Welding coordination personnel have responsibilities in the manufacturing operation for welding and welding related activities; and their competence and knowledge will be demonstrated e.g. by training, education and/or relevant manufacturing experience. Welding coordination personnel can range from e.g. welding supervisor, storeman, design engineer or sub-contractor. Guidance on training and qualification is provided in WTIA Guidance Note TGN-3834-04 "How to specify training and qualifications of welding coordination personnel to meet ISO 3834".

Welding coordination may be undertaken by one or a number of persons. Where welding coordination is carried out by a number of persons, tasks and responsibilities shall be allocated for each person.

A Responsible Welding Coordinator (RWC) must be authorised to oversee, and possibly be responsible for, the welding-related activities of all welding coordination personnel (see 3 below).

Welding coordination requirements can be specified by a manufacturer, contract or an application standard. For some work activities, the coordination tasks and responsibilities may be carried out by subcontractors. Subcontracted activities shall remain subject to welding coordination in accordance with ISO 14731:2006.

### **3.2 Specification of Tasks and Responsibilities**

A job specification for the welding coordination personnel when required e.g. by contracting parties or an application standard, shall include their tasks and responsibilities.

Identification of the assigned responsibilities is dependent on the:

- position in the manufacturing organisation and responsibilities;
- extent of authorisation to accept by signing on behalf of the organisation;
- extent of authorisation to carry out the assigned tasks.

The individual functions and responsibilities covered should show the individual's status within the organisation and the extent of the individual's authority, as well as who he/she reports or refers to, for welding/quality related decisions outside his/her competence.

The standard requires that all welding coordination staff shall be competent by virtue of general technical knowledge, and specialised technical knowledge relevant to the allotted tasks (via theoretical training and experience).

#### 4. Manufacturing Organisation's Responsibilities

The organisation should clearly identify the position, responsibilities and extent of authorisation of each person allocated a welding coordination task. Table 1, shows a number of areas for which the tasks and responsibilities need to be defined and allocated:

**Table 1 – Welding-related activities**

|   |   |
|---|---|
| Review of Requirements                  | Materials   |
| Technical Review                        | Inspection and Testing Before Welding                                     |
| Subcontracting                          | Inspection and Testing During Welding                                     |
| Welding Personnel                       | Inspection and Testing After Welding Post-weld Heat Treatment             |
| Equipment                               | Non-conformance and Corrective Actions                                    |
| Production Planning                     | Calibration and Validation of Measuring, Inspection and Testing Equipment |
| Qualification of the Welding Procedures | Identification and Traceability   |
| Welding Procedure Specifications        | Quality Records   |
| Work Instructions                       |   |
| Welding Consumables                     |   |

The organisation should nominate at least one Responsible Welding Coordinator (RWC). In large organisations with different products or sites there may be more than one RWC. The RWC:

- should be competent to sign on behalf of the organisation;
- should be authorised to oversee, and could be responsible for, the work of other welding coordinators on the same site or in the same department;
- could have the title Responsible Welding Coordinator added to his/her normal job title and function, e.g. Technical Manager & RWC

#### 5. Technical Knowledge

##### 5.1 General for all Welding Coordination Personnel

For all tasks assigned, welding coordination personnel shall be able to demonstrate adequate technical knowledge to enable such tasks to be performed satisfactorily.

The following factors should be considered:

- general technical knowledge;
- specialised technical knowledge relevant to the assigned tasks. This may be attained by a combination of theoretical knowledge, training and/or experience.

The extent of required manufacturing experience, education and technical knowledge should be decided by the organisation and will depend on the assigned tasks and responsibilities.

##### 5.2 Responsible Welding Coordination Personnel

A Responsible Welding Coordinator (RWC) must be nominated by the organisation. The responsibilities of the RWC to carry out, supervise and/or oversee welding engineering tasks will be clearly defined by the organisation. He must be authorised to sign on behalf of the organisation in contractual welding quality related matters, e.g. accepting technical welding requirements, or verifying that the organisation has complied with all relevant quality considerations in the production of the product.

Three different levels of RWC are given. The selection of RWC depends mainly on the variability and technical complexity of the welding procedures required.

- **Comprehensive Technical Knowledge**

Welding coordination personnel with full technical knowledge for planning, executing, supervising and testing of all tasks and responsibilities in welding fabrication.

For example, where a broad range of materials, processes, thicknesses, procedures & NDT requirements is involved, where a wide variety of products are to be manufactured to differing codes, major fabrication projects etc.

- **Specific Technical Knowledge**

Welding coordination personnel where technical knowledge is sufficient for planning, executing, supervising and testing of the tasks and responsibilities in welding fabrication within a selective or limited technical field.

For example, where welding processes, procedures, materials and products do not change significantly etc.

- **Basic Technical Knowledge**

Welding coordination personnel where technical knowledge is sufficient for planning, executing, supervising and testing of the tasks and responsibilities in welding fabrication within a limited technical field involving simple welded constructions

For example, where the welding processes and procedures, materials etc. do not vary, the welds produced are not critical from safety aspects etc.

## **6. Minimum Requirements for Education, Examination and Certification**

ISO 3834-5:2005(E) Annex A (informative) 'Guidelines on qualification/education scheme for personnel dealing with welding coordination and inspection' states that:

The International Institute of Welding (IIW) has, on a voluntary basis, prepared guidelines for minimum requirements for the education, training, examination and qualification of personnel dealing with welding coordination and inspection.

The minimum requirements for personnel dealing with welding coordination are stated in the following documents:

- International Welding Engineer (IWE) Doc. IAB-002-2000/EFW-409;
- International Welding Technologist (IWT) Doc. IAB-003-2000/EFW-410;
- International Welding Specialist (IWS) Doc. IAB-004-2000/EFW-411.

The minimum requirements for inspection personnel are stated in the following document:

- International Welding Inspection Personnel (IWIP) Doc. IAB-041-2001/EFW-450.

Personnel dealing with welding coordination and inspection fulfilling the requirements of these documents, or holding acceptable national qualifications, are considered to satisfy relevant requirements.

## **7. Establishment of Welding Coordination Tasks and Responsibilities**

The 7 Steps in the process of establishing welding coordination are:

### **Step 1**

Review ISO 14731 and identify the roles within the organisation's structure and organisation that fall within Welding Coordination

### **Step 2**

Draw up an organisation chart showing all relevant positions and their inter-relationships

### **Step 3**

Decide on the number, types, levels of welding activities and tasks to be coordinated in your Organisation

### **Step 4**

Review the competencies of the organisation's personnel as part of a gap analysis against the requirements of ISO 3834 and ISO 14731

### **Step 5**

Allocate the activities, tasks and responsibilities to personnel within the organisation chart. While allocating these consider:

- Your organisation's reporting process;
- Competencies of different personnel;
- Retraining of individuals to be competent for the tasks allocated.

Note: Deputies should be identified to act in the absence of welding coordinators.

### **Step 6**

After allocation, if some of the activities are not filled, then

- Recruit more personnel or re-train existing personnel;
- Allocate to assisting personnel;
- Subcontract the activities to a suitably competent person external to the organisation.

### **Step 7**

Decide who the Responsible Welding Coordinator (RWC) will be. The RWC shall

- Have overall responsibility for coordination of all welding and welding-related activities;
- Be authorised to sign on behalf of the organisation in contractual welding quality related matters or delegate such signing e.g. goods release for despatch, inspection sign-off.

Notes:

1. Further guidance is available from WTIA TGN-3834-07 "Self assessment of quality requirements – Checklist and action plan".
2. The title Authorised Welding Coordinator has changed to Responsible Welding Coordinator in the 2006 edition of ISO 14731.
3. In large organisations, with different products and sites, there may be more than one RWC.
4. Some countries believe that the RWC must be an International Welding Engineer (IWE) for an ISO 3834 Part 2 or Part 3 company.
5. In other circumstances, it is believed that the RWC can have other competency qualifications satisfactory to the employer and if inadequate the relevant tasks may be subcontracted.

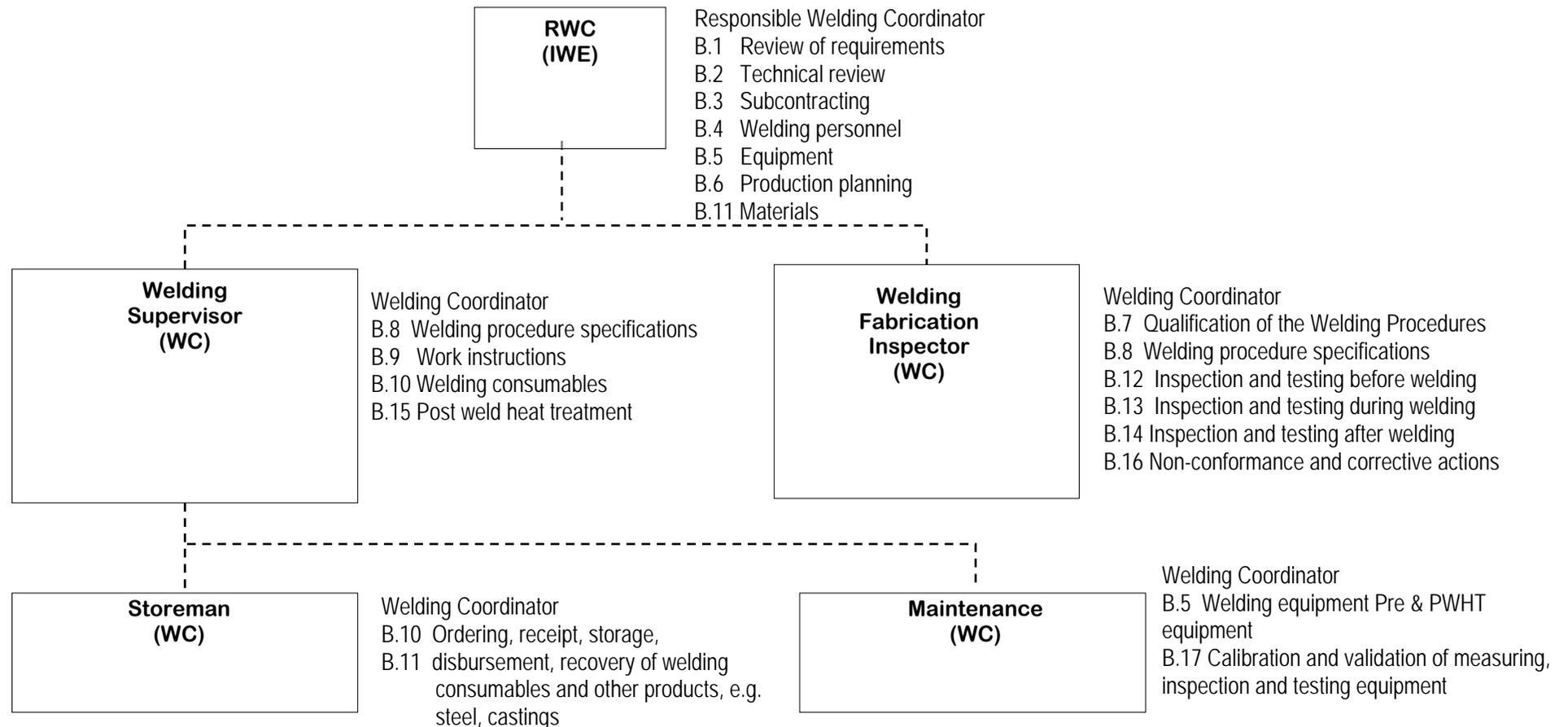
## 8. Some Welding Coordination Scenarios

The international standard ISO 14731:2005 *Welding coordination - Tasks and responsibilities* identifies the quality-related responsibilities and tasks in the coordination of welding-related activities as shown in Table 1. It is not expected that the same person will be involved in every activity but the standard clearly requires that "the tasks and responsibilities of personnel involved in welding related activities should be clearly defined". This may be conveniently achieved by a series of job specifications and an organisational relationship diagram (Table 2, Table 3 & Figure 1).

A few simplified scenarios are discussed to illustrate the variations in welding coordination including examples of the split of activities from Table 1. The structure and allocation of activities can vary according to the size, number and type of employees, departments etc. For example, people responsible for certain welding coordination activities may report to different managers e.g. Welding Supervisor to the Production Manager.

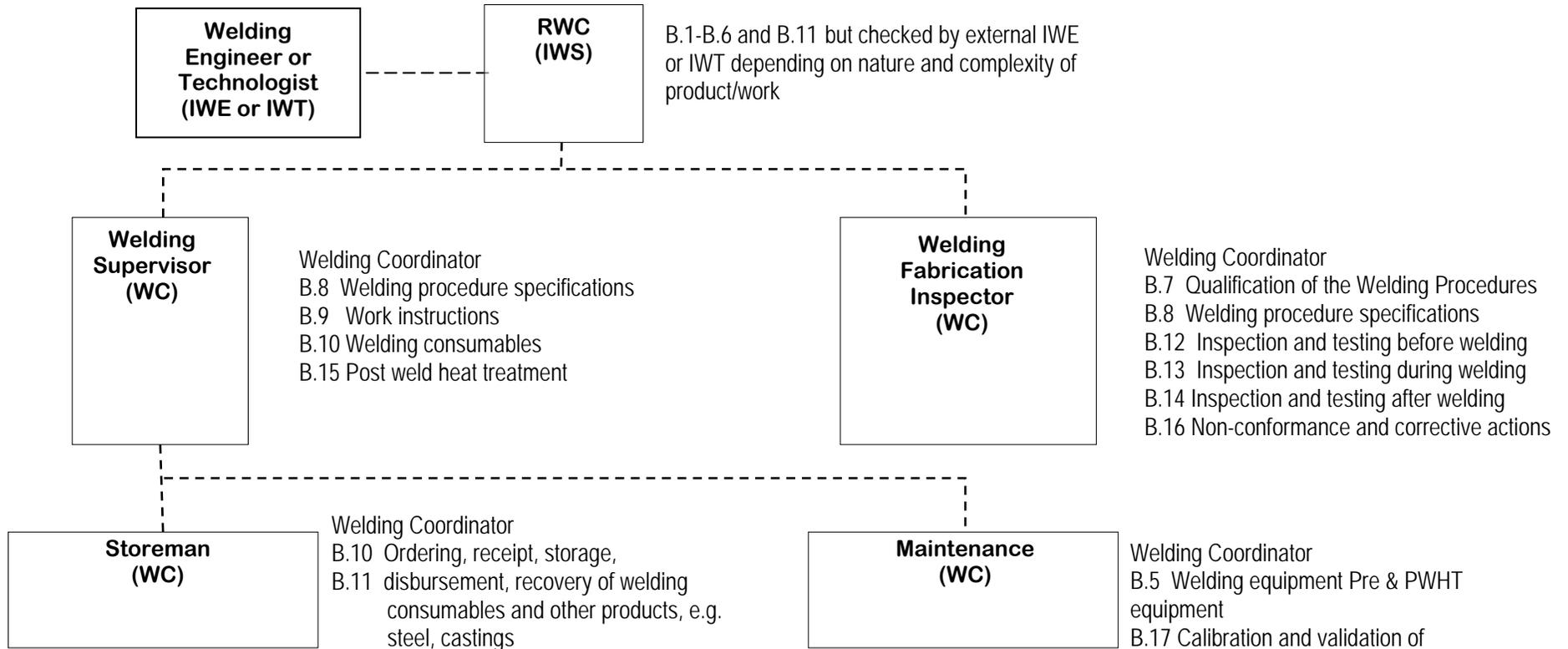
Scenario 1:

- Production is to ISO 3834:2005 Part 2 or Part 3
- The RWC has IWE qualifications
- The RWC takes overall responsibility for all the activities including some detailed activities (B.1-B.6 and B.11)



Scenario 2:

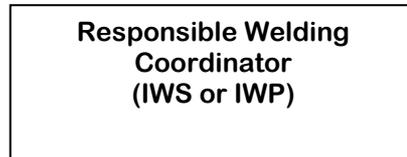
- Production is to ISO 3834:2005 Part 2 or Part 3
- The RWC has IWS qualifications
- The RWC does not feel competent to be directly responsible for activities B.1-B.6 and B.11
- Activities B.1-B.6 and B.11 are subcontracted to an external person who has IWE/IWT qualification
- The RWC still takes overall responsibility for all the activities related to welding



Note: Scenarios 1 & 2 could also apply to companies whose main line of business is not welding fabrication, construction, repair and maintenance but have workshops that perform such work to varying degrees e.g. smelters, mines, power stations, chemical plants

Scenario 3:

- Production is to ISO 3834:2005 Part 4
- Welding coordination is not a requirement
- It is still recommended however, that a RWC be appointed due to the many benefits of welding coordination ( e.g. improved productivity, cost savings, efficiency etc)
- An IWS or IWP is recommended depending on the nature and complexity of the product/work

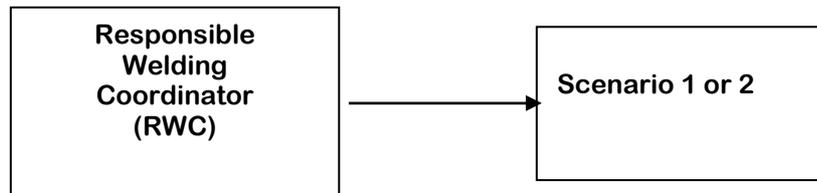


Scenario 4:

- The company does not perform any fabrication, construction or maintenance activity e.g. purchasers, specifiers, project managers etc
- They still need to coordinate certain welding activities however, e.g. review of requirements, technical review, materials, subcontract work etc
- A RWC shall be appointed to take overall responsibility for all the activities related to welding

Responsible Welding Coordinator

- B.1 Review of requirements
- B.2 Technical review
- B.3 Subcontracting
- B.4 Welding personnel
- B.5 Equipment
- B.6 Production planning
- B.11 Materials



Depends on nature and Complexity of work

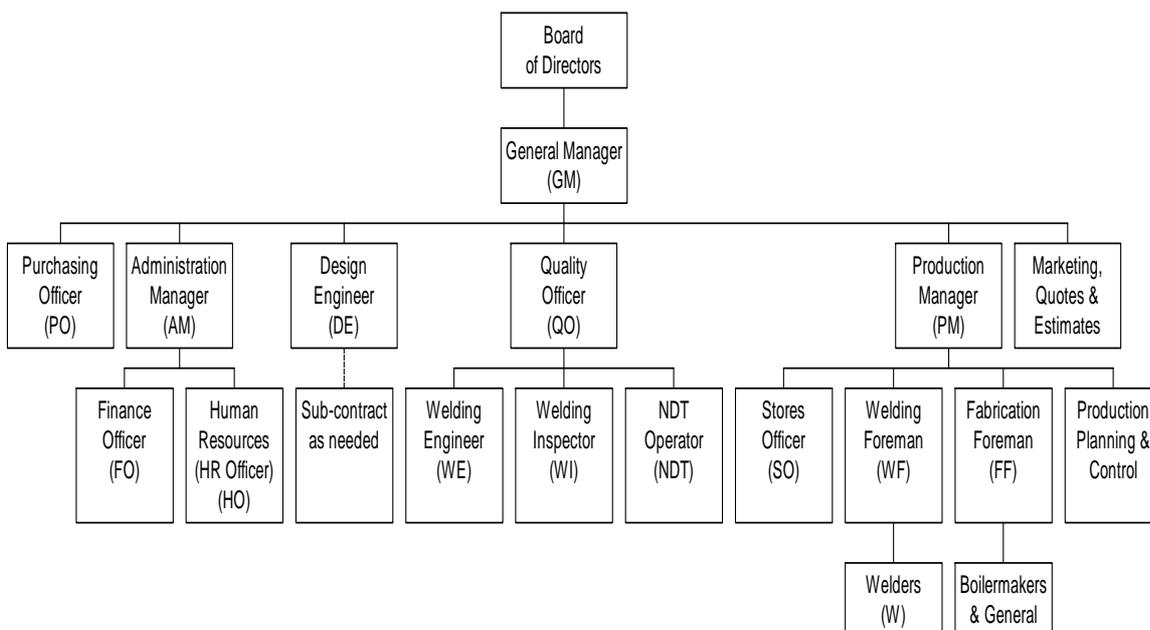


Figure 1: Typical organisation structure for a SME  
(Refer WTIA ETT: MS01-TWM-01)

**Table 2: WELDING COORDINATION ACTIVITIES AND RESPONSIBILITIES TO ISO 14731:2006 AND SELF-ASSESSMENT CHECKLIST**

| Activities & Responsibilities   | Yes | No |
|---|-----|----|
| <b>B.1 Review of requirements</b>   |     |    |
| The following elements shall be considered in a review of requirements:   |     |    |
| a) the product standard to be used, together with any supplementary requirements;   |     |    |
| b) the capability of the manufacturer to meet the prescribed requirements.  |     |    |
| <b>B.2 Technical review</b>   |     |    |
| The following elements shall be considered in a technical review:   |     |    |
| a) the parent material(s) specification and welded joint properties;  |     |    |
| b) the joint location with relation to the design requirements;   |     |    |
| c) quality and acceptance requirements for welds;   |     |    |
| d) the location, accessibility and sequence of welds, including accessibility for inspection and non-destructive testing;   |     |    |
| e) other welding requirements, e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content, permanent backing, use of peening, surface finish, weld profile; |     |    |
| f) the dimensions and details of joint preparation and completed weld.  |     |    |
| <b>B.3 Sub-contracting</b>  |     |    |
| With regard to sub-contracting, the suitability of any sub-contractor for welding fabrication shall be considered.  |     |    |
| <b>B.4 Welding personnel</b>  |     |    |
| With regard to welding personnel, the qualification of welders and welding operators, brazers and brazing operators shall be considered.  |     |    |
| <b>B.5 Equipment</b>  |     |    |
| The following elements shall be considered with regard to equipment:  |     |    |
| a) the suitability of welding and associated equipment;   |     |    |
| b) auxiliaries and equipment supply, identification and handling;   |     |    |
| c) personal protective equipment and other safety equipment, directly associated with the applicable manufacturing process;   |     |    |
| d) equipment maintenance;   |     |    |
| e) equipment verification and validation.   |     |    |
| <b>B.6 Production planning</b>  |     |    |
| The following elements shall be considered with regard to production planning:  |     |    |
| a) reference to the appropriate procedure specifications for welding and allied processes;  |     |    |
| b) the sequence in which the welds are to be made;  |     |    |
| c) environmental conditions (e.g. protection from wind, temperature and rain);  |     |    |
| d) the allocation of qualified personnel;   |     |    |
| e) equipment for preheating and post-heat treatment, including temperature indicators;  |     |    |
| f) the arrangement for any production test.   |     |    |
| <b>B.7 Qualification of the welding procedures</b>  |     |    |
| With regard to the qualification of the welding procedures, the method and range of qualification shall be considered.  |     |    |
| <b>B.8 Welding procedure specifications</b>   |     |    |
| With regard to welding procedure specifications, the range of qualification shall be considered.  |     |    |
| <b>B.9 Work instructions</b>  |     |    |
| With regard to work instructions, the issuing and use of work instructions shall be considered.   |     |    |

| Activities & Responsibilities   | Yes | No |
|---|-----|----|
| <b>B.10 Welding consumables</b>   |     |    |
| The following elements shall be considered with regard to welding consumables:  |     |    |
| a) compatibility;   |     |    |
| b) delivery conditions;   |     |    |
| c) any supplementary requirements in the welding consumable purchasing specifications, including the type of welding consumable inspection document;                                    |     |    |
| d) the storage and handling of welding consumables.   |     |    |
| <b>B.11 Materials</b>   |     |    |
| The following elements shall be considered with regard to materials:  |     |    |
| a) any supplementary requirements in the material purchasing specifications, including the type of inspection document for the material;  |     |    |
| b) the storage and handling of parent material;   |     |    |
| c) traceability.  |     |    |
| <b>B.12 Inspection and testing before welding</b>   |     |    |
| The following elements shall be considered with regard to inspection and testing before welding:  |     |    |
| a) the suitability and validity of welders' and welding operators' qualification certificates;  |     |    |
| b) the suitability of the welding procedure specification;  |     |    |
| c) the identity of the parent material;   |     |    |
| d) the identity of welding consumables;   |     |    |
| e) joint preparation (e.g. shape and dimensions);   |     |    |
| f) fit-up, jiggling and tacking;  |     |    |
| g) any special requirements in the welding procedure specification (e.g. prevention of distortion);   |     |    |
| h) the suitability of working conditions for welding, including the environment.  |     |    |
| <b>B.13 Inspection and testing during welding</b>   |     |    |
| The following elements shall be considered with regard to inspection and testing during welding:  |     |    |
| a) essential welding parameters (e.g. welding current, arc voltage and travel speed);   |     |    |
| b) the preheating/interpass temperature;  |     |    |
| c) the cleaning and shape of runs and layers of weld metal;   |     |    |
| d) back gouging;  |     |    |
| e) the welding sequence;  |     |    |
| f) the correct use and handling of welding consumables;   |     |    |
| g) control of distortion;   |     |    |
| h) any intermediate examination (e.g. checking dimensions).   |     |    |
| <b>B.14 Inspection and testing after welding</b>  |     |    |
| The following elements shall be considered with regard to inspection and testing after welding:   |     |    |
| a) the use of visual inspection (for completeness of welding, weld dimensions, shape);  |     |    |
| b) the use of non-destructive testing;  |     |    |
| c) the use of destructive testing;  |     |    |
| d) the form, shape, tolerance and dimensions of the construction;   |     |    |
| e) the results and records of post-operations (e.g. post-weld heat treatment, ageing).  |     |    |
| <b>B.15 Post-weld heat treatment</b>  |     |    |
| With regard to post-weld heat treatment, performance in accordance with the specification shall be considered.  |     |    |
| <b>B.16 Non-conformance and corrective actions</b>  |     |    |
| With regard to non-conformance and corrective actions, the necessary measures and actions (e.g. weld repairs, re-assessment of repaired welds, corrective actions) shall be considered. |     |    |
| <b>B.17 Calibration and validation of measuring, inspection and testing equipment</b>   |     |    |
| With regard to the calibration and validation of measuring, inspection and testing equipment, the necessary methods and actions shall be considered.                                    |     |    |

| Activities & Responsibilities  | Yes | No |
|--|-----|----|
| <b>B.18 Identification and traceability</b>  |     |    |
| The following elements shall be considered with regard to identification and traceability:   |     |    |
| a) the identification of production plans;   |     |    |
| b) the identification of routing cards;  |     |    |
| c) the identification of weld locations in construction;   |     |    |
| d) the identification of non-destructive testing procedures and personnel;   |     |    |
| e) the identification of the welding consumable (e.g. designation, trade name, manufacturer of consumables and batch or cast numbers);             |     |    |
| f) the identification and/or traceability of parent material (e.g. type, cast number);   |     |    |
| g) the identification of the location of repairs;  |     |    |
| h) the identification of the location of temporary attachments;  |     |    |
| i) traceability for fully mechanized and automatic welding units to specific welds;  |     |    |
| j) traceability of welder and welding operators to specific welds;   |     |    |
| k) traceability of welding procedure specifications to specific welds.   |     |    |
| <b>B.19 Quality records</b>  |     |    |
| With regard to quality records, the preparation and maintenance of the necessary records (including subcontracted activities) shall be considered. |     |    |

**Table 3: WELDING COORDINATION ACTIVITIES AND RESPONSIBILITIES TO ISO 14731:2006  
TASK ALLOCATION CHECKLIST**

| Activities & Responsibilities   | PM | WM | DE | QO | SO | WF | PO | WI | FF | NDT | W | B |
|---|----|----|----|----|----|----|----|----|----|-----|---|---|
| <b>B.1 Review of requirements</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the product standard to be used, together with any supplementary requirements;   |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the capability of the manufacturer to meet the prescribed requirements.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.2 Technical review</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the parent material(s) specification and welded joint properties;  |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the joint location with relation to the design requirements;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) quality and acceptance requirements for welds;   |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the location, accessibility and sequence of welds, including accessibility for inspection and nondestructive testing;  |    |    |    |    |    |    |    |    |    |     |   |   |
| e) other welding requirements, e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content, permanent backing, use of peening, surface finish, weld profile; |    |    |    |    |    |    |    |    |    |     |   |   |
| f) the dimensions and details of joint preparation and completed weld.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.3 Sub-contracting</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to sub-contracting, the suitability of any sub-contractor for welding fabrication shall be considered.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.4 Welding personnel</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to welding personnel, the qualification of welders and welding operators, brazers and brazing operators shall be considered.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.5 Equipment</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the suitability of welding and associated equipment;   |    |    |    |    |    |    |    |    |    |     |   |   |
| b) auxiliaries and equipment supply, identification and handling;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) personal protective equipment and other safety equipment, directly associated with the applicable manufacturing process;   |    |    |    |    |    |    |    |    |    |     |   |   |
| d) equipment maintenance;   |    |    |    |    |    |    |    |    |    |     |   |   |
| e) equipment verification and validation.   |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.6 Production planning</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) reference to the appropriate procedure specifications for welding and allied processes;  |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the sequence in which the welds are to be made;  |    |    |    |    |    |    |    |    |    |     |   |   |
| c) environmental conditions (e.g. protection from wind, temperature and rain);  |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the allocation of qualified personnel;   |    |    |    |    |    |    |    |    |    |     |   |   |
| e) equipment for preheating and post-heat treatment, including temperature indicators;  |    |    |    |    |    |    |    |    |    |     |   |   |
| f) the arrangement for any production test.   |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.7 Qualification of the welding procedures</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to the qualification of the welding procedures, the method and range of qualification shall be considered.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.8 Welding procedure specifications</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to welding procedure specifications, the range of qualification shall be considered.  |    |    |    |    |    |    |    |    |    |     |   |   |

| Activities & Responsibilities  | PM | WM | DE | QO | SO | WF | PO | WI | FF | NDT | W | B |
|--|----|----|----|----|----|----|----|----|----|-----|---|---|
| <b>B.9 Work instructions</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to work instructions, the issuing and use of work instructions shall be considered.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.10 Welding consumables</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) compatibility;  |    |    |    |    |    |    |    |    |    |     |   |   |
| b) delivery conditions;  |    |    |    |    |    |    |    |    |    |     |   |   |
| c) any supplementary requirements in the welding consumable purchasing specifications, including the type of welding consumable inspection document; |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the storage and handling of welding consumables.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.11 Materials</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) any supplementary requirements in the material purchasing specifications, including the type of inspection document for the material;             |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the storage and handling of parent material;  |    |    |    |    |    |    |    |    |    |     |   |   |
| c) traceability.   |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.12 Inspection and testing before welding</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the suitability and validity of welders' and welding operators' qualification certificates;   |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the suitability of the welding procedure specification;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) the identity of the parent material;  |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the identity of welding consumables;  |    |    |    |    |    |    |    |    |    |     |   |   |
| e) joint preparation (e.g. shape and dimensions);  |    |    |    |    |    |    |    |    |    |     |   |   |
| f) fit-up, jiggging and tacking;   |    |    |    |    |    |    |    |    |    |     |   |   |
| g) any special requirements in the welding procedure specification (e.g. prevention of distortion);  |    |    |    |    |    |    |    |    |    |     |   |   |
| h) the suitability of working conditions for welding, including the environment.   |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.13 Inspection and testing during welding</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| a) essential welding parameters (e.g. welding current, arc voltage and travel speed);  |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the preheating/interpass temperature;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) the cleaning and shape of runs and layers of weld metal;  |    |    |    |    |    |    |    |    |    |     |   |   |
| d) back gouging;   |    |    |    |    |    |    |    |    |    |     |   |   |
| e) the welding sequence;   |    |    |    |    |    |    |    |    |    |     |   |   |
| f) the correct use and handling of welding consumables;  |    |    |    |    |    |    |    |    |    |     |   |   |
| g) control of distortion;  |    |    |    |    |    |    |    |    |    |     |   |   |
| h) any intermediate examination (e.g. checking dimensions).  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.14 Inspection and testing after welding</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the use of visual inspection (for completeness of welding, weld dimensions, shape);   |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the use of non-destructive testing;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) the use of destructive testing;   |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the form, shape, tolerance and dimensions of the construction;  |    |    |    |    |    |    |    |    |    |     |   |   |
| e) the results and records of post-operations (e.g. post-weld heat treatment, ageing).   |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.15 Post-weld heat treatment</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to post-weld heat treatment, performance in accordance with the specification shall be considered.                                       |    |    |    |    |    |    |    |    |    |     |   |   |

| Activities & Responsibilities   | PM | WM | DE | QO | SO | WF | PO | WI | FF | NDT | W | B |
|---|----|----|----|----|----|----|----|----|----|-----|---|---|
| <b>B.16 Non-conformance and corrective actions</b>  |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to non-conformance and corrective actions, the necessary measures and actions (e.g. weld repairs, re-assessment of repaired welds, corrective actions) shall be considered. |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.17 Calibration and validation of measuring, inspection and testing equipment</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to the calibration and validation of measuring, inspection and testing equipment, the necessary methods and actions shall be considered.                                    |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.18 Identification and traceability</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| a) the identification of production plans;  |    |    |    |    |    |    |    |    |    |     |   |   |
| b) the identification of routing cards;   |    |    |    |    |    |    |    |    |    |     |   |   |
| c) the identification of weld locations in construction;  |    |    |    |    |    |    |    |    |    |     |   |   |
| d) the identification of non-destructive testing procedures and personnel;  |    |    |    |    |    |    |    |    |    |     |   |   |
| e) the identification of the welding consumable (e.g. designation, trade name, manufacturer of consumables and batch or cast numbers);  |    |    |    |    |    |    |    |    |    |     |   |   |
| f) the identification and/or traceability of parent material (e.g. type, cast number);  |    |    |    |    |    |    |    |    |    |     |   |   |
| g) the identification of the location of repairs;   |    |    |    |    |    |    |    |    |    |     |   |   |
| h) the identification of the location of temporary attachments;   |    |    |    |    |    |    |    |    |    |     |   |   |
| i) traceability for fully mechanized and automatic welding units to specific welds;   |    |    |    |    |    |    |    |    |    |     |   |   |
| j) traceability of welder and welding operators to specific welds;  |    |    |    |    |    |    |    |    |    |     |   |   |
| k) traceability of welding procedure specifications to specific welds.  |    |    |    |    |    |    |    |    |    |     |   |   |
| <b>B.19 Quality records</b>   |    |    |    |    |    |    |    |    |    |     |   |   |
| With regard to quality records, the preparation and maintenance of the necessary records (including subcontracted activities) shall be considered.                                      |    |    |    |    |    |    |    |    |    |     |   |   |

**KEY**

DE – Design Engineer      WF-Welding Foreman      WI – Welding Inspector  
WF – Welding Foreman      PO – Purchasing Officer      W – Welder B- Boilermaker  
SO – Stores Officer      QO – Quality Officer      FF - Fabrication Foreman  
NDT – Non Destructive Testing Operator      P/WM – Production/Welding Manager (also AWC)

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TGN-3834-06

***How to obtain certification including  
the IIW Manufacturer Certification  
Scheme (MCS) for the Management  
of Quality in Welded Fabrication***

## **1. Scope**

Certification to ISO 3834:2005 "Quality requirements for fusion welding of metallic materials" provides independent recognition of an organisation's system to manage its welding activities and demonstrate its commitment to deliver quality welded products. This Standard has been updated since the publication of AS/NZS ISO 3834 in 1999. The reason for the introduction of the AS/NZS Standard was that ISO 3834 1994, on which the Australian standard was based, referred to other ISO or EN Standards to which a Fabricator MUST comply in order to claim compliance with ISO 3834. Appendices were added to the Australian standard to show equivalent Australian Standards. Some national and international standards referring to ISO 3834/EN729 are shown in Appendix 1.

ISO 3834 Part 5 2005 edition, however, makes it clear that Technically Equivalent Standards may be used instead of EN or ISO Standards, but it is the responsibility of the Fabricator to demonstrate technical equivalence. WTIA therefore recommends that the Appendices of AS/NZS ISO 3834:1999 are included in every Fabricator's ISO 3834 procedures to demonstrate technical equivalence.

The purpose of this document is to advise welding manufacturers including fabrication, construction, repair and maintenance organisations on how to become certified to ISO 3834, and to give background to discerning purchasers of welded equipment.

In accordance with ISO 3834, a Manufacturer is defined as a 'person or organisation responsible for the welding production'. The Standard uses this term to describe any such organisation involved in manufacturing, fabrication, construction, repair or maintenance as well as other organisations such as asset owners, project management and design companies where the requirements of ISO 3834 are applicable to activities such as weld design, contract development, and the review of technical requirements and competencies of subcontractors.

This is the sixth of seven WTIA Technical Guidance Notes making up an Expert Technology Tool (TGN-3834-01 to 07) for industry on the benefits and application of ISO 3834:2005 and ISO 14731:2006 "Welding coordination - Tasks and responsibilities". A Power Point presentation of this material is available as TGN-3834-01. Detailed explanatory information on the two standards is given in the WTIA ETT and ISO 3834 Part 6.

Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

## **2. Relationship with ISO 9001**

Many organisations have, or are planning to have, their management system certificated to ISO 9001. Welding was described in quality terms however, as a 'special process' which means that being certificated to ISO 9001 does not necessarily demonstrate the competence of that organisation to manufacture welded products. For this reason certification to ISO 3834 is offered on its own, or to a company with, or planning to have, ISO 9001 certification. Many purchasers of welded components are now insisting on certification to ISO 3834 to help ensure technical conformance with requirements.

## **3. Procedure for Certification to ISO 3834**

Step 1: The manufacturing organisation, in consultation with its customer, reviews the customer's products and requirements and decides on which of the three levels of quality requirements of ISO 3834 i.e. comprehensive, standard or basic, is appropriate. Note that it is a WTIA requirement that if an Organisation already has ISO 9001, then certification must be to ISO 3834 Part 2 Comprehensive Requirements. If in doubt, the WTIA is available for advice.

Step 2: Establish and implement a welding management system to ISO 3834. WTIA TGN-3834-07 "Self assessment of quality requirements - Checklist and action plan" is available to guide you through this process.

- Step 3: Request an application form from WTIA (WFCS F01, Preliminary Information Enquiry) and information pack from: WTIA (e-mail c.smallbone@wtia.com.au)
- Step 4: Complete the application form and return it and evidence of any existing certification to WTIA PO Box 6165 Silverwater NSW 1811.
- Step 5: Based on the information in the application form, a quotation will be sent to the organisation by WTIA
- Step 6: On receipt of the order from the company by WTIA, it will appoint the Assessment Team to carry out an assessment
- Step 7: The Lead Assessor sends WTIA Form 3834-2 Document Review to the Fabricator.
- Step 8: The Fabricator completes the Document Review Form and submits this together with the Quality Management documentation to the WTIA appointed Assessor, who then carries out a further review.
- Step 9: An on-site audit by the appointed Lead Assessor(s) is conducted
- Step 10: Part of the audit involves an interview with the Responsible Welding Coordinator. One of the criteria for an acceptable RWC is qualification, and the recommended qualifications are IWE, IWT or International Welding Specialist (IWS) in accordance with the International Institute of Welding. Other equivalent qualifications would be considered during the interview stage. If the RWC does not have such a qualification, then someone else within the Fabrication Company must, even if that person is an outside Contractor. There must be a direct link between the Contractor and the Fabricator.
- Step 11: The initial assessment report, a review of any corrective actions and a final report are submitted to the WTIA
- Step 12: Once the organisation has demonstrated compliance to ISO 3834, a certificate to the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication will be issued indicating the standards against which certification has been achieved.
- Step 13: Surveillance will be carried out annually to demonstrate ongoing compliance
- Step 14: Reassessment against ISO 3834 will be required every five years

#### **4. Procedure for ISO 9001 and ISO 3834 Certification**

WTIA recommends that when you are ready to either apply for certification to ISO 9001 or are to undergo an audit to re-approve your ISO 9001 that it is wise to consider also applying for ISO 3834 certification, and suggests you take the following steps:

- Step 1: Inform the company undertaking your ISO 9001 certification (approval or re-approval) that you wish to undertake a single assessment or audit involving both that company and WTIA to obtain two certifications to ISO 9001 and ISO 3834. The company should be aware that whereas an ISO 9001 audit looks mainly at Tier 1 Quality Management System documents, an ISO 3834 audit concentrates on Tier 2 and 3 documents and consequently, takes at least two days on site. Also, such companies should also be accredited against EA-6/02 "EA Guidelines on the Use of EN 45 011 and EN 45 012 for Certification to EN 729" to issue certification against ISO 3834.
- Step 2: Go to Step 3 in Section 3 above
- Step 3: Make contact with WTIA through email c.smallbone@wtia.com.au. The WTIA will contact you to make further arrangements.
- Step 4: Your own company, the ISO 9001 certification body and WTIA will coordinate the mutually agreed dates to conduct the joint single audit. The ISO 9001 audit may finish before the ISO 3834 audit All other steps will be as shown in Section 3 above, with Steps 9 and 10 being coordinated on a similar basis.

You may decide that you are quite happy to undertake certification to ISO 3834 completely separately from ISO 9001. If so, simply follow Section 3 above.

Important Note: It is important that the company performing the ISO 9001 certification does not persuade you to by-pass the above advice and issue you with its own "ISO 3834 certification" unless it is so accredited. WTIA can advise on this.

In Europe, companies conducting an ISO 3834 assessment or audit must be accredited to EA-6/02 EA “Guidelines on the use of EN45011 and EN45012 for Certification to EN729” (EN729 is now EN ISO 3834). The IIW is improving this by implementing these Guidelines as Rules and integrating them into the Rules described in the IIW Manufacturer Certification Scheme (MCS) for the Management of Quality in Welded Fabrication.

In Australia, purchasers will question the qualifications and experience of the assessors being used to audit you to ISO 3834. This is the reason why the WTIA personnel used are all International Welding Engineers (IWE) or International Welding Technologists (IWT) or equivalent and approved by TWI UK as ISO 3834 Lead Assessors.

## 5. Costs

Final costs for certification to ISO 3834 alone are dependent upon particular circumstance such as size of company, travel etc. but for guidance the following estimates are provided:

- a) Certification \$8,000 (excluding travel and accommodation)
- b) Surveillance \$1,000 (excluding travel and accommodation)

Typically, the fee includes two days for documentation review, two days for Site assessment for small specialised manufacturers and possibly longer for more extensive reviews, and one day for reporting. Also, certification may cover more than one site but all sites need to be assessed.

A company considering certification can obtain advice on how to prepare for it by ringing the WTIA, purchase WTIA TN 24 and purchase a copy of ISO 3834

## APPENDIX 1 – Some National/International Standards Specifying ISO 3834/EN 729

| <i>Standard</i>                   | <i>Title</i>   |
|-----------------------------------|--|
| AS/NZS ISO 3834, ISO 3834, EN 729 | “Quality requirements for welding-Fusion welding of metallic materials- Parts 1 to 4”  |
| AS/NZS 1554                       | “Structural Steel Welding”   |
| AS 3920.1                         | “Assurance of product quality – Pressure equipment manufacture”  |
| AS 2885                           | “Pipelines – Gas and liquid petroleum”   |
| ENV 1090 1                        | “General rules and rules for buildings”  |
| DIN 6700                          | “Welding of railway Vehicles Part 2”   |
| DEF-STAN 03-34/1                  | “Steel armour”   |
| DEF-STAN 08-39/1                  | “Light alloy armour”   |
| EEMUA                             | Draft Specification “The Fabrication of Non-Primary structural Steelwork for Fixed Offshore Installations (March 99)             |
| prENV 19999-2                     | “Eurocode 9: Design of aluminium structures – Part 2 Structures susceptible to fatigue (April 97)                                |
| prEN 12732                        | “Gas supply systems – Welding steel pipework – Functional requirements (January 97)  |
| prEN 12952-5                      | “Water tube boilers – Part 5: Workmanship and construction (July 97)   |
| prEN 1011-4                       | “Welding – Recommendations for welding of metallic materials – Part 4: Arc welding of aluminium and aluminium alloys”            |
| prEN 131-2                        | “Ladders – Part 2: Requirements, testing, marking”   |
| EN 1065:1999                      | “Adjustable telescopic steel props – Product specifications, design and assessment by calculation and tests”                     |
| prEN 1090-2                       | “Execution of steel and aluminium structures – Part 2: Technical requirements for the execution of steel structures”             |
| prEN 1090-3                       | “Execution of steel and aluminium structures – Part 3: Technical rules for execution of aluminium structures”                    |
| prEN 1092-1                       | “Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges” |

|                    |  |
|--------------------|--|
| EN 1247:2004       | "Foundry machinery – Safety requirements for ladles, pouring equipment, centrifugal casting machines, continuous and semi continuous casting machines"         |
| EN 1251-2:2000     | "Cryogenic vessels – Transportable vacuum insulated vessels of not more than 1000 litres volume – Part 2: Design, fabrication, inspection and testing"         |
| EN 1915-2:2001     | "Aircraft ground support equipment – General requirements – Part 2: Stability and strength requirements, calculations and test methods"                        |
| EN 12493:2001      | "Welded steel tanks for liquefied petroleum gas (LPG) – Road tankers – Design and manufacture"   |
| EN 12732:2000      | "Gas supply systems – Welding steel pipework – Functional requirements"  |
| EN 12811-2:2004    | "Temporary works equipment – Part 2: Information on materials"   |
| EN 12952-5:2002    | "Water-tube boilers and auxiliary installations – Part 5: Workmanship and construction of pressure parts of the boiler"  |
| EN 13084-1:2000    | "Free-standing industrial chimneys – Part 1: General requirements"   |
| EN 13094:2004      | "Tanks for transport of dangerous goods – Metallic tanks with a working pressure not exceeding 0,5 bar – Design and construction"                              |
| EN 13218:2002      | "Machine tools – Safety – Stationary grinding machines"  |
| EN 13445-4:2002    | "Unfired pressure vessels – Part 4: Fabrication"   |
| EN 13814:2005      | "Fairground and amusement park machinery and structures – Safety"  |
| EN 13941:2003      | "Design and installation of preinsulated bonded pipe systems for district heating"   |
| EN 13981-1:2003    | "Aluminium and aluminium alloys – Products for structural railway applications – Technical conditions for inspection and delivery – Part 1: Extruded products" |
| EN 13981-2:2004    | "Aluminium and aluminium alloys – Products for structural railway applications – Technical conditions for inspection and delivery – Part 2: Plates and sheets" |
| EN 14025:2004      | "Tanks for transport of dangerous goods – Metallic pressure tanks – Design and construction"   |
| EN 14183:2004      | "Step stools"  |
| prEN 15020         | "Railway applications – Towing coupler – Performance requirements, specific interface geometry and test methods"   |
| prEN 15085         | "Welding of railway vehicles"  |
| ISO/FDIS 5840:2005 | "Cardiovascular implants – Cardiac valve prostheses"   |
| ISO 15590-2:2004   | "Petroleum and natural gas industries – Induction bends, fittings and flanges for pipeline transportation systems – Part 2: Fittings"                          |

**Acknowledgment:** WTIA wishes to acknowledge the support for this initiative of the following Technology Expert Group members and WTIA SMART Industry Sector Groups: Building and Construction, Defence, Mining, Pressure Equipment, Rail, Road Transport, Water, Medical Devices and Sensors, Pipelines, Power Generation, Alumina Processing and Petro/Chemical.

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TGN-3834-07

***Self assessment of quality  
requirements - Checklist and action  
plan to ISO 3834:2005 Part 2: Quality  
requirements for fusion welding of  
metallic materials***

## 1. Scope

Before any company can claim compliance to ISO 3834 quality requirements, it should review its arrangements and operating procedures. Presented on pages 2 to 30 is a checklist that will assist a company in performing a self-assessment of its current position with reference to its compliance with ISO 3834 Part 2.

Each element of the standard has been addressed with a series of questions that requires one of three responses: **YES**, **NO** and **NOT APPLICABLE**. The questions have been so designed so as to draw out the strengths and weaknesses of the existing quality management system. These questions are typical of those that could be raised by a customer or certification body assessor during a visit to verify that the company does indeed comply with the Standard.

When a question is answered in the negative, the area "Action Plan" may be used to evolve methods and solutions to overcome that specific drawback.

In accordance with ISO 3834, a Manufacturer is defined as a 'person or organisation responsible for the welding production'. The Standard uses this term to describe any such organisation involved in manufacturing, fabrication, construction, repair or maintenance as well as other organisations such as asset owners, project management and design companies where the requirements of ISO 3834 are applicable to activities such as weld design, contract development, and the review of technical requirements and competencies of subcontractors.

This is the seventh of seven WTIA Technical Guidance Notes making up an Expert Technology Tool (TGN-3834-01 to 07) for industry on the benefits and application of ISO 3834:2005 and ISO 14731:2006 "Welding coordination - Tasks and responsibilities". A Power Point presentation of this material is available as TGN-3834-1. Detailed explanatory information on the two standards is given in the WTIA ETT and ISO 3834 Part 6.

Feedback is welcome from anybody who can add value to the Technical Guidance Notes. Please feel free to suggest amendments, deletions, additions etc. by emailing [a.rorke@wtia.com.au](mailto:a.rorke@wtia.com.au).

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| Clause | Quality Requirements  | Y | N | NA | ACTION PLAN |
|--------|---|---|---|----|-------------|
| 5      | <b>REVIEW OF REQUIREMENTS AND TECHNICAL REVIEW</b>  |   |   |    |             |
| 5.1    | <b>General</b>  |   |   |    |             |
|        | Do we have a dedicated organisation and staff to review all incoming potential contracts and ensure that all information necessary to carry out the fabrication operations (e.g. contract requirements, design data provided by the purchaser etc.) is available prior to the commencement of the work? |   |   |    |             |
|        | Does that group/person have adequate knowledge of welding-related topics combined with knowledge of the company's capability including:   |   |   |    |             |
|        | <ul style="list-style-type: none"> <li>The product standard to be used, together with supplementary requirements</li> </ul>   |   |   |    |             |
|        | <ul style="list-style-type: none"> <li>Statutory and regulatory requirements</li> </ul>   |   |   |    |             |
|        | <ul style="list-style-type: none"> <li>Any additional requirement determined by the manufacturer</li> </ul>   |   |   |    |             |
|        | <ul style="list-style-type: none"> <li>The capability of the manufacturer to meet the prescribed requirements</li> </ul>  |   |   |    |             |
|        | Would the Responsible Welding Coordinator (RWC) be happy to sign to accept the technically-binding contractual requirements of a prepared tender offer?   |   |   |    |             |

| Clause     | Quality Requirements  | Y | N | NA | ACTION PLAN |
|------------|---|---|---|----|-------------|
|            | Can we declare our capability to meet all welding contract requirements and ensure that adequate planning and sufficient resources are available to achieve delivery schedules and that documentation is clear and unambiguous? |   |   |    |             |
|            | Do we ensure that any variations between the contract and previous tender documentation are identified and the purchaser notified of any program, cost or engineering changes that may result?                                  |   |   |    |             |
| <b>5.2</b> | <b>Review of requirements</b>   |   |   |    |             |
|            | Do the written or diagrammatic welding coordination arrangements truly identify the responsible persons in contract review and the relationships between them?  |   |   |    |             |
|            | Does the responsible person, who considers incoming enquiries, have adequate welding awareness to identify any new (to the company) requirements?   |   |   |    |             |
|            | If the responsible person is not the RWC, does he/she report the welding related requirements to the RWC?   |   |   |    |             |
|            | Is there objective evidence of the welding competence of the persons in the contract review team?   |   |   |    |             |
|            | Is there evidence of a systematic procedure for the contract review activity and consultations within the welding coordination team and production departments?   |   |   |    |             |

|            | Quality Requirements   | Y | N | NA | ACTION PLAN |
|------------|--|---|---|----|-------------|
|            | Are technical problems identified and highlighted to the purchaser, estimating department, quality or production manager as appropriate to ensure the contract requirements are clear, understood, allowed for and accepted by all departments involved before the contract is signed? |   |   |    |             |
| <b>5.3</b> | <b>Technical review</b>  |   |   |    |             |
|            | Have we reviewed as a minimum the items referred to in ISO 3834.2 or .3 as well as any contractual requirements, application standards and any supplementary requirements such as:   |   |   |    |             |
|            | • post weld heat treatment requirements?   |   |   |    |             |
|            | • inspection and testing requirements?   |   |   |    |             |
|            | • technical requirements to be met by the specification of welding procedure, NDT procedures and heat treatment procedures?  |   |   |    |             |
|            | • the approach to be used for welding procedure approval?  |   |   |    |             |
|            | • the approval of personnel?   |   |   |    |             |
|            | • selection, identification and/or traceability (e.g. materials, welders, welds)?  |   |   |    |             |
|            | • quality control arrangements, including any involvement of an independent body?  |   |   |    |             |
|            | • other welding requirements (e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content)?   |   |   |    |             |
|            | • environmental conditions relevant to welding on site (e.g. very low temperature ambient conditions or any necessity to provide protection against adverse weather condition)?  |   |   |    |             |

|               |   |          |          |           |                    |
|---------------|---|----------|----------|-----------|--------------------|
|               | <ul style="list-style-type: none"> <li>• sub contracting?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• availability of shop space, facilities and services?</li> </ul>  |          |          |           |                    |
| <b>Clause</b> | <b>Quality Requirements</b>   | <b>Y</b> | <b>N</b> | <b>NA</b> | <b>ACTION PLAN</b> |
|               | <ul style="list-style-type: none"> <li>• material delivery program?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• handling of non-conformance?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• further contractual requirements?</li> </ul>   |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• Is there evidence that the welding related issues are identified by a competent Welding Coordinator involved in the Design Review?</li> </ul>        |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• Is there evidence that the points raised by the welding coordinator are properly incorporated with production engineering of the product?</li> </ul> |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• Do we consider the following design requirements:</li> </ul>   |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• location, accessibility and sequence of all welds?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• surface finishes and weld profiles?</li> </ul>   |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• parent metal(s) specification and welded joint properties?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• permanent backing?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• welds which are to be made in the workshop or elsewhere?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• dimensions and details of joint preparation and completed joint?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• use of special methods (e.g. to achieve full penetration without backing when welded from one side only)?</li> </ul>                                 |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• quality and acceptance requirements for welds?</li> </ul>  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• other special requirements (e.g. acceptability of peening or heat treatment)?</li> </ul>   |          |          |           |                    |
|               | Do we have written procedures which:  |          |          |           |                    |
|               | <ul style="list-style-type: none"> <li>• describe how we review the contract and the</li> </ul>   |          |          |           |                    |

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  | design requirement to ensure that all above-mentioned points are considered? |  |  |  |  |
|--|--|--|--|--|--|

| Clause   | Quality Requirements  | Y | N | NA | ACTION PLAN |
|----------|---|---|---|----|-------------|
|          | <b>DOCUMENTATION</b>  |   |   |    |             |
|          | <b>Required Documents</b>   |   |   |    |             |
|          | Documents showing how the manufacturer carries out the requirement review and the technical review  |   |   |    |             |
|          | <b>Typical forms required</b>   |   |   |    |             |
|          | Requirements review checklist   |   |   |    |             |
|          | Technical review checklist  |   |   |    |             |
|          | <b>IIW Manufacturer Certification Scheme (Additional information)</b>   |   |   |    |             |
|          |   |   |   |    |             |
|          |   |   |   |    |             |
| <b>6</b> | <b>SUBCONTRACTING</b>   |   |   |    |             |
|          | Has the company carried out and recorded an appraisal of the Subcontractor's competence and quality system?   |   |   |    |             |
|          | Have we identified the person responsible for ensuring that all subcontractors are provided with the requisite information?   |   |   |    |             |
|          | Is there a systematic procedure for specifying subcontract requirements, providing the information required and monitoring the quality of work of subcontractors?             |   |   |    |             |
|          | Do we identify the need to subcontract elements of production during the Design Review? (E.g. welding inspection, NDT, heat treatment)?                                       |   |   |    |             |
|          | Do we subcontract some of these activities?   |   |   |    |             |
|          | Are subcontractors given all requirements necessary for carrying out the defined activities (including those concerning the review of requirements and the technical review)? |   |   |    |             |

| Clause | Quality Requirements  | Y | N | NA | ACTION PLAN |
|--------|---|---|---|----|-------------|
|        | Do we require records and documentation of the subcontractor's work?  |   |   |    |             |
|        | Do we ensure that all the activities transferred to subcontractors are carried out in conformity with the minimum requirements of the ISO 3834 Part 2 or 3?                 |   |   |    |             |
|        | Do we make sure that the subcontractor can comply with the quality requirements of the contract?  |   |   |    |             |
|        | If the design of the product is subcontracted, are supplementary requirements (if any and when necessary) specified to the subcontractors?                                  |   |   |    |             |
|        | Do we have a written procedure that describes how the sub- contracted activities comply with the requirements of the contract/design specifications?                        |   |   |    |             |
|        | Does this procedure define the tasks and responsibilities of the welding coordination?  |   |   |    |             |
|        | Does the subcontractor have a competent Responsible Welding Coordinator (RWC) and other relevant and appropriate welding coordination personnel?                            |   |   |    |             |
|        | <b>DOCUMENTATION</b>  |   |   |    |             |
|        | <b>Required Documents</b>   |   |   |    |             |
|        | Documents explaining how subcontracted operations related to welding comply with the requirements of the contract, including how subcontractors are assessed and controlled |   |   |    |             |
|        | <b>Typical forms required</b>   |   |   |    |             |
|        | Assessment report of subcontractors   |   |   |    |             |
|        | Subcontractor monitoring check lists  |   |   |    |             |
|        | Inspection reports  |   |   |    |             |

|  |   |  |  |  |  |
|--|---|--|--|--|--|
|  | <b>IIW Manufacturer Certification Scheme<br/>(Additional information)</b> |  |  |  |  |
|  |   |  |  |  |  |
|  |   |  |  |  |  |

| <b>Clause</b> | <b>Quality Requirements</b>   | <b>Y</b> | <b>N</b> | <b>NA</b> | <b>ACTION PLAN</b> |
|---------------|---|----------|----------|-----------|--------------------|
| <b>7</b>      | <b>WELDING PERSONNEL</b>  |          |          |           |                    |
| <b>7.1</b>    | <b>General</b>  |          |          |           |                    |
|               | Can we show that we employ sufficient and competent personnel for the planning, performing and supervising of the welding production according to the specified requirements? |          |          |           |                    |
|               | Do we have record of the curriculum vitae and experience of our personnel?  |          |          |           |                    |
|               | Do we have an organisational plan and structure showing the relationships between personnel and the correct implementation of welding coordination to ISO 14731?              |          |          |           |                    |
| <b>7.2</b>    | <b>Welders and welding operators</b>  |          |          |           |                    |
|               | Are all welders and welding operators approved by an appropriate test according to the appropriate code/standard?   |          |          |           |                    |
|               | Are all records of approval maintained up to date?  |          |          |           |                    |
|               | Are the welders qualifications controlled and in accordance with the contract? (Or the company's standard)?   |          |          |           |                    |
|               | Have we identified the person responsible for maintaining welder qualifications?  |          |          |           |                    |
|               | Is the activity shown in the Welding coordination arrangement?  |          |          |           |                    |

| Clause     | Quality Requirements  | Y | N | NA | ACTION PLAN |
|------------|---|---|---|----|-------------|
| <b>7.3</b> | <b>Welding coordination personnel</b>   |   |   |    |             |
|            | Do we have at our disposal a Responsible Welding Coordinator and appropriate welding coordination personnel according to ISO 14731?   |   |   |    |             |
|            | Do we have at our disposal any professional figures according to the IIW qualification scheme (IWE, IWT, IWS & IWP)?  |   |   |    |             |
|            | Is there evidence of these links being used in practice?  |   |   |    |             |
|            | Is there sufficient evidence of the competence of each Welding Coordinator (e.g. training and accreditation in the operation of the various activities/duties allocated and procedures used)? |   |   |    |             |
|            | Do the welding coordination personnel supply the welding personnel with WPS or work instructions, so as to ensure that all activities can be properly performed and controlled?               |   |   |    |             |
|            | Has the Responsible Welding Coordinator(s) sufficient authority to take necessary action for ensuring and maintaining the product quality according to the requirement specified?             |   |   |    |             |
|            | Have the duties, inter-relationships and limits of responsibility of the welding coordination personnel been clearly defined by us?   |   |   |    |             |
|            | Have they been explained clearly to, and understood by such personnel?  |   |   |    |             |
|            | <b>DOCUMENTATION</b>  |   |   |    |             |
|            | <b>Required Documents</b>   |   |   |    |             |
|            | Documents for training, assessment and appointment of personnel   |   |   |    |             |
|            | Documents to record appointments, tasks, interrelationships and limits of responsibility of the welding coordination personnel  |   |   |    |             |

| Clause     | Quality Requirements  | Y | N | NA | ACTION PLAN |
|------------|---|---|---|----|-------------|
|            | <b>Typical forms required</b>   |   |   |    |             |
|            | Welder/welding operator qualification certificates  |   |   |    |             |
|            | Chart of welding coordination interactions  |   |   |    |             |
|            | Welding coordination personnel qualification records and authorisations   |   |   |    |             |
|            | <b>IIW Manufacturer Certification Scheme (Additional information)</b>   |   |   |    |             |
|            |   |   |   |    |             |
| <b>8</b>   | <b>INSPECTION AND TESTING PERSONNEL</b>   |   |   |    |             |
| <b>8.1</b> | <b>General</b>  |   |   |    |             |
|            | Do we have at our disposal sufficient and competent personnel for planning and performing, supervising, inspecting, testing and examining the welding production according to the specified requirements? |   |   |    |             |
|            | Do we have at our disposal welding inspection personnel appropriately qualified to the IIW International Welding Inspector Standard Level or WTIA Senior Welding Inspector?                               |   |   |    |             |
| <b>8.2</b> | <b>Non-destructive testing personnel</b>  |   |   |    |             |
|            | Is the organisation of the NDT team properly detailed?  |   |   |    |             |
|            | Do we ensure that NDT procedures are written and approved and that the operators are qualified?   |   |   |    |             |
|            | Is NDT coordinated during production planning and production itself etc.?   |   |   |    |             |
|            | If self-inspection by welders is used, is it properly detailed and have they been trained?  |   |   |    |             |
|            | Are the NDT personnel approved according to ISO 9712 or other equivalent standard?  |   |   |    |             |
|            | Are the destructive tests carried out in appropriately qualified facilities with personnel approved by the manufacturer?  |   |   |    |             |

| Clause     | Quality Requirements   | Y | N | NA | ACTION PLAN |
|------------|--|---|---|----|-------------|
|            | <b>DOCUMENTATION</b>   |   |   |    |             |
|            | <b>Required Documents</b>  |   |   |    |             |
|            | Documentation for training, assessment and appointment of personnel  |   |   |    |             |
|            |  |   |   |    |             |
|            | <b>Typical forms required</b>  |   |   |    |             |
|            | Report on qualification for visual testing   |   |   |    |             |
|            | Report on ability of near vision acuity and colour vision  |   |   |    |             |
|            | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|            |  |   |   |    |             |
|            |  |   |   |    |             |
| <b>9</b>   | <b>EQUIPMENT</b>   |   |   |    |             |
| <b>9.1</b> | <b>Production and testing equipment</b>  |   |   |    |             |
|            | Are the following pieces of equipment available, when necessary:   |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>welding power sources and other machines?</li> </ul>  |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>equipment for joint preparation and cutting, including thermal cutting?</li> </ul>                  |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>equipment for preheating and post-weld heat treatment, including temperature indicators?</li> </ul> |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>cranes and handling equipment used for welding production?</li> </ul>                               |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>PPE and other safety equipment, directly associated with welding?</li> </ul>                        |   |   |    |             |

| Clause     | Quality Requirements   | Y | N | NA | ACTION PLAN |
|------------|--|---|---|----|-------------|
|            | • ovens and quivers etc used for treatment of welding consumables?   |   |   |    |             |
|            | • jigs and fixtures?   |   |   |    |             |
|            | • surface cleaning facilities?   |   |   |    |             |
|            | • destructive and NDT facilities?  |   |   |    |             |
|            | Do we have a written procedure for identification, control, maintenance and calibration (where relevant) of all production equipment?  |   |   |    |             |
|            | Is this procedure including arrangements to prevent production use of defective equipment?   |   |   |    |             |
| <b>9.2</b> | <b>Description of equipment</b>  |   |   |    |             |
|            | Do we have an updated list identifying the essential equipment used for welding production that provide an evaluation of the capacity and capability of the workshop and other production areas? |   |   |    |             |
|            | Are the following (minimum) entries indicated (where relevant):  |   |   |    |             |
|            | • capacity of the largest cranes?  |   |   |    |             |
|            | • size of components the workshop is able to handle?   |   |   |    |             |
|            | • capability mechanised or automatic welding equipment?  |   |   |    |             |

| Clause     | Quality Requirements   | Y | N | NA | ACTION PLAN |
|------------|--|---|---|----|-------------|
|            | <ul style="list-style-type: none"> <li>dimensions and maximum temperature of furnaces for PWHT?</li> </ul>                                       |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>capacities of rolling, bending and cutting equipment?</li> </ul>  |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>number of welding power sources for each welding process?</li> </ul>                                      |   |   |    |             |
|            | <ul style="list-style-type: none"> <li>other essential facilities</li> </ul>   |   |   |    |             |
| <b>9.3</b> | <b>Suitability of equipment</b>  |   |   |    |             |
|            | Is the equipment used adequate for the application concerned?  |   |   |    |             |
|            | If specified in the contract is the welding and heating equipment subject to approval?   |   |   |    |             |
| <b>9.4</b> | <b>New equipment</b>   |   |   |    |             |
|            | Do we carry out approval tests in accordance with appropriate standards whenever relevant, after installation of new (or refurbished) equipment? |   |   |    |             |
|            | Are records of the tests kept?   |   |   |    |             |
| <b>9.5</b> | <b>Equipment maintenance</b>   |   |   |    |             |
|            | Is there a list of welding-related capital plant owned by the company?   |   |   |    |             |
|            | Have operators been trained in care and adjustment of the minor equipment they use routinely?  |   |   |    |             |
|            | Is the RWC involved in the procurement of new or replaced equipment?   |   |   |    |             |

| Clause | Quality Requirements   | Y | N | NA | ACTION PLAN |
|--------|--|---|---|----|-------------|
|        | Do we have documented plans for the maintenance of equipment, ensuring checks of those items which control essential variables in the WPS: |   |   |    |             |
|        | • condition of guides in equipment for thermal cutting, mechanised welding fixtures etc?   |   |   |    |             |
|        | • condition of ammeters, voltmeters and flow meters used for the operation of the welding machines?  |   |   |    |             |
|        | • condition of cables, hoses, connectors etc?  |   |   |    |             |
|        | • condition of control system in mechanised and/or automatic welding equipment?  |   |   |    |             |
|        | • condition of temperature measurement and other temperature measurement instruments?  |   |   |    |             |
|        | • condition of wire feeders and conduits?  |   |   |    |             |
|        | Do we take adequate action for avoiding the use of defective equipment?  |   |   |    |             |
|        | <b>DOCUMENTATION</b>   |   |   |    |             |
|        | <b>Required Documents</b>  |   |   |    |             |
|        | Documents for the identification, control, maintenance and calibration (where relevant) of all production and inspection equipment         |   |   |    |             |
|        | Equipment maintenance schedule   |   |   |    |             |
|        | <b>Typical forms required</b>  |   |   |    |             |
|        | Essential equipment list   |   |   |    |             |
|        | Test reports of new equipment  |   |   |    |             |

| Clause      | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-------------|---|---|---|----|-------------|
|             | Equipment maintenance record  |   |   |    |             |
|             | <b>IIW Manufacturer Certification Scheme<br/>(Additional information)</b>   |   |   |    |             |
|             |   |   |   |    |             |
|             |   |   |   |    |             |
| <b>10</b>   | <b>WELDING AND RELATED ACTIVITES</b>  |   |   |    |             |
| <b>10.1</b> | <b>Production Planning</b>  |   |   |    |             |
|             | Do we have a person responsible for approving the production plan?  |   |   |    |             |
|             | Do we have a procedure/method for presenting this production plan to others?  |   |   |    |             |
|             | Does the production plan identify where existing or new welding procedures are required?  |   |   |    |             |
|             | Are welding processes, position and sequences detailed where appropriate?   |   |   |    |             |
|             | Are all the essential requirements considered, e.g. procurement, preparation, training approvals availability of resources, subcontracts etc.?  |   |   |    |             |
|             | Do we carry out an adequate production plan compatible with the production and testing facilities to be used in the manufacture of the product?   |   |   |    |             |
|             | Does such a plan include at least the following points, as relevant:  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• specification of the sequence by which the product shall be manufactured (e.g. as a single part of sub-assemblies and the sequence of subsequent final assembly)?</li> </ul> |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• identification of the individual processes required?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• reference to the appropriate specifications for welding and allied processes?</li> </ul>   |   |   |    |             |

| Clause      | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-------------|--|---|---|----|-------------|
|             | <ul style="list-style-type: none"> <li>sequence in which the welds are to be made, if applicable?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>order and timing in which the individual processes are to be performed?</li> </ul>                                  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>specifications for inspection and testing, including the involvement of any independent inspection body?</li> </ul> |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>provision for protection from environment conditions (e.g protection from wind &amp; rain)?</li> </ul>              |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>item identification of batches, components or parts?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>Allocation of qualified personnel</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>Arrangement for any production test</li> </ul>  |   |   |    |             |
| <b>10.2</b> | <b>Welding Procedure Specifications</b>  |   |   |    |             |
|             | Do we prepare WPS in accordance with the appropriate Standard or contract specification?   |   |   |    |             |
|             | Are there arrangements to ensure that the correct WPSs and procedures are used in production?  |   |   |    |             |
| <b>10.3</b> | <b>Qualification of the welding procedures</b>   |   |   |    |             |
|             | Does the contract (or product specification) require weld procedure qualification tests?   |   |   |    |             |
|             | Is the most involved Welding Coordinator knowledgeable about the Weld Procedure Specification (e.g. ASME IX etc)?  |   |   |    |             |
|             | Are WPS parameters selected to give the optimum approval range?  |   |   |    |             |

| Clause      | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-------------|--|---|---|----|-------------|
|             | Is the Welding Coordinator adequately qualified and experienced to carry out these tasks and be accepted by the customer etc?  |   |   |    |             |
|             | Are the welding procedures approved prior to any production welding?   |   |   |    |             |
|             | Is the method of approval in accordance with the relevant application standards or as stated in the contract?  |   |   |    |             |
|             | Are other procedures (e.g. procedure for heat treatment) approved if required in the relevant application standard and/or in the contract?   |   |   |    |             |
| <b>10.4</b> | <b>Work Instruction</b>  |   |   |    |             |
|             | Do we use the WPS directly in the workshop?  |   |   |    |             |
|             | Do we use dedicated work instructions in the workshop instead?   |   |   |    |             |
|             | Are dedicated work instructions (welding procedures) prepared from an approved WPS?  |   |   |    |             |
| <b>10.5</b> | <b>Procedures for preparation and control of documents</b>   |   |   |    |             |
|             | Do we maintain procedures for the control of relevant quality documents (e.g. WPS, welding procedure approval record, welder approval certificates) weld records, NDT and PWHT procedures? |   |   |    |             |
|             | <b>DOCUMENTATION</b>   |   |   |    |             |
|             | <b>Required Documents</b>  |   |   |    |             |
|             | Documents for production planning and for controlling production operations.   |   |   |    |             |
|             | Production plans   |   |   |    |             |
|             | WPQRs  |   |   |    |             |
|             | Procedures for the preparation and control of relevant quality   |   |   |    |             |

| Clause      | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-------------|--|---|---|----|-------------|
|             | <b>Typical forms required</b>  |   |   |    |             |
|             | Drawings and sketches  |   |   |    |             |
|             | WPQR   |   |   |    |             |
|             | WPS or work instruction  |   |   |    |             |
|             | Process instructions, e.g. NDT, coating  |   |   |    |             |
|             | Process records, e.g. NDT test reports, coating records and test   |   |   |    |             |
|             | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|             |  |   |   |    |             |
|             |  |   |   |    |             |
| <b>11</b>   | <b>WELDING CONSUMABLES</b>   |   |   |    |             |
| <b>11.1</b> | <b>General</b>   |   |   |    |             |
|             | Have we specified responsibilities and procedures involved in the control of welding consumables?  |   |   |    |             |
| <b>11.2</b> | <b>Batch Testing</b>   |   |   |    |             |
|             | If required in the contract, is batch testing of welding consumables carried out?  |   |   |    |             |
| <b>11.3</b> | <b>Storage and handling</b>  |   |   |    |             |
|             | Have we implemented procedures for storage, handling and use of consumables which avoid moisture pick-up, oxidation, damage etc.?          |   |   |    |             |
|             | Are these procedures in accordance with the supplier's recommendations, if any?  |   |   |    |             |
|             | Are electrode procurement, storage and issue arrangements reviewed by a competent Welding Coordinator?                                     |   |   |    |             |
|             | Where special or low hydrogen consumables are used, are there other audit arrangements to ensure the requirements are being complied with? |   |   |    |             |

| Clause    | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-----------|--|---|---|----|-------------|
|           | Do we implement procedures for storage, handling and use of consumables which avoid moisture pickup, oxidation, damage etc.?             |   |   |    |             |
|           | Are these procedures in accordance with the supplier's recommendations, if any?  |   |   |    |             |
|           | <b>DOCUMENTATION</b>   |   |   |    |             |
|           | <b>Required Documents</b>  |   |   |    |             |
|           | Documents for storage, handling, identification and use of welding consumables.  |   |   |    |             |
|           | <b>Typical forms required</b>  |   |   |    |             |
|           | Consumable test certificates   |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|           |  |   |   |    |             |
|           |  |   |   |    |             |
| <b>12</b> | <b>STORAGE OF PARENT MATERIALS</b>   |   |   |    |             |
|           | Do we have a person responsible for storage and handling of materials?   |   |   |    |             |
|           | If various materials are used, is there a method of identifying each to ensure that inadvertent use of a wrong material is not possible? |   |   |    |             |
|           | Are parent materials stored so that they will not be adversely affected before use?  |   |   |    |             |
|           | Do we have written procedures for storing parent material including bought-in items and products provided by the purchaser?              |   |   |    |             |
|           | <b>DOCUMENTATION</b>   |   |   |    |             |
|           | <b>Required Documents</b>  |   |   |    |             |
|           | Documents for storing parent metals, including work in progress and completed product awaiting despatch                                  |   |   |    |             |
|           | Storage plans  |   |   |    |             |

| Clause    | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-----------|---|---|---|----|-------------|
|           | <b>Typical forms required</b>   |   |   |    |             |
|           | Parent metal test certificates  |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>   |   |   |    |             |
|           |   |   |   |    |             |
| <b>13</b> | <b>POST WELD HEAT TREATMENT</b>   |   |   |    |             |
|           | Do we have a person who details and approves PWHT procedures?   |   |   |    |             |
|           | Is the procedure agreed offered to the Customer before implementation?  |   |   |    |             |
|           | Do we verify the acceptance of the records?   |   |   |    |             |
|           | Are requirements for PWHT (including provision of test plate material) properly considered during contract review?  |   |   |    |             |
|           | Where required, are PWHT procedures compatible with the parent material, welded joint, construction etc. and in accordance with the application standard and/or specified requirements? |   |   |    |             |
|           | Do we issue adequate records, made during the process, of PWHT?   |   |   |    |             |
|           | Do such records demonstrate that the PWHT procedures have been followed?  |   |   |    |             |
|           | <b>DOCUMENTATION</b>  |   |   |    |             |
|           | <b>Required Documents</b>   |   |   |    |             |
|           | Documents for production planning and controlling production operations.  |   |   |    |             |
|           | Heat treatment procedures   |   |   |    |             |
|           | <b>Typical forms required</b>   |   |   |    |             |
|           | Heat treatment records  |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>   |   |   |    |             |
|           |   |   |   |    |             |

| Clause      | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-------------|---|---|---|----|-------------|
| <b>14</b>   | <b>INSPECTION &amp; TESTING</b>   |   |   |    |             |
| <b>14.1</b> | <b>General</b>  |   |   |    |             |
|             | Is there an inspection schedule or plan for implementing inspection and testing at appropriate stages of the manufacturing process, as required by the contract requirements? |   |   |    |             |
| <b>14.2</b> | <b>Inspection and Testing before welding</b>  |   |   |    |             |
|             | Are the following items checked before the start of welding, when necessary:  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• suitability and validity of welder approval certificates to the appropriate part of relevant code/standard)?</li> </ul>              |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• suitability of WPS to the appropriate part of relevant code/standard)?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• identity of parent material?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• identity of welding consumables?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• joint preparation (shape and dimensions) to the appropriate part of relevant code/standard)?</li> </ul>                              |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• fit-up, jiggling and tacking?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• any special welding requirements in WPS (e.g. preheat, prevention of distortion)?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• arrangement for any production tests?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>• suitability of working and environmental conditions for welding?</li> </ul>  |   |   |    |             |

| Clause      | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-------------|---|---|---|----|-------------|
|             | <ul style="list-style-type: none"> <li>suitability and conditions of equipment?</li> </ul>  |   |   |    |             |
| <b>14.3</b> | <b>Inspection and testing during welding</b>  |   |   |    |             |
|             | Are the following items checked, during welding, as required by the inspection plan and procedures:                               |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>essential welding parameters (e.g. welding current, arc voltage, travel speed)?</li> </ul> |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>preheating/interpass temperature to the relevant code/standard?</li> </ul>                 |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>cleaning and shape of runs and layers of weld metal?</li> </ul>                            |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>back gouging?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>welding sequence?</li> </ul>   |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>correct use and handling control of consumables?</li> </ul>                                |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>control of distortion?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>any intermediate examination? (eg. checking dimensions)</li> </ul>                         |   |   |    |             |
| <b>14.4</b> | <b>Inspection and testing after welding</b>   |   |   |    |             |
|             | Are the following inspections carried out, after welding, when necessary, in accordance with the contract requirements:           |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>visual inspection?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>other NDT?</li> </ul>  |   |   |    |             |

| Clause      | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-------------|---|---|---|----|-------------|
|             | <ul style="list-style-type: none"> <li>destructive testing?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>evaluation of shape and dimensions of the welded construction?</li> </ul>  |   |   |    |             |
|             | <ul style="list-style-type: none"> <li>evaluation of the results and records of post-weld operations ( e.g. PWHT)</li> </ul>  |   |   |    |             |
| <b>14.5</b> | <b>Inspection and test status</b>   |   |   |    |             |
|             | Do we have a person who is responsible for authorising the use of specific Welding Procedures or Welders on a production task?                                      |   |   |    |             |
|             | Can this person be shown to be competent?   |   |   |    |             |
|             | Do we have a person who is responsible for supervising production?  |   |   |    |             |
|             | Is this person competent and of sufficient status to be able to ensure that the welding in practice conforms to the technical requirements and acceptable practice? |   |   |    |             |
|             | If he/she is not the RWC, how can the RWC be confident that these requirements are being satisfied?   |   |   |    |             |
|             | Are there procedures in place to ensure that the welders are given adequate instructions?   |   |   |    |             |
|             | Are acceptance standards for edge preparation, fit up, tacking, welding inspection etc. detailed and available to those responsible for that inspection?            |   |   |    |             |
|             | Are records kept of any inspection before, during and after welding?  |   |   |    |             |
|             | Are measures taken as appropriate to indicate the status of inspection and testing of the product during manufacture?   |   |   |    |             |

| Clause    | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-----------|--|---|---|----|-------------|
|           | <b>DOCUMENTATION</b>   |   |   |    |             |
|           | <b>Required Documents</b>  |   |   |    |             |
|           | Documents for production planning and controlling production operations  |   |   |    |             |
|           | Inspection plans   |   |   |    |             |
|           | Inspection procedures  |   |   |    |             |
|           | <b>Typical forms required</b>  |   |   |    |             |
|           | Dimensional reports  |   |   |    |             |
|           | Inspection reports   |   |   |    |             |
|           | Records of repairs   |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|           |  |   |   |    |             |
|           |  |   |   |    |             |
| <b>15</b> | <b>NON-CONFORMANCE AND CORRECTIVE ACTIONS</b>  |   |   |    |             |
|           | Does the company have approved weld repair procedures?   |   |   |    |             |
|           | Is there a management procedure to control the development, approval and use of special procedures?  |   |   |    |             |
|           | Do we collate records of weld defects and who is the responsible person?   |   |   |    |             |
|           | Do we have a person responsible for ensuring that all repairs have been properly completed?  |   |   |    |             |
|           | Are measures implemented for controlling components or items that do not conform to specified requirements, in order to prevent their inadvertent use? |   |   |    |             |
|           | When repair and/or rectification is undertaken by us are appropriate procedures available at repair workstations?                                      |   |   |    |             |

| Clause    | Quality Requirements  | Y | N | NA | ACTION PLAN |
|-----------|---|---|---|----|-------------|
|           | When repair and/or rectification is carried out are the items reinspected, tested and examined in accordance with the appropriate requirements?             |   |   |    |             |
|           | Do we have procedures or arrangements to identify and remedy any conditions that could adversely affect the quality of the product or production processes? |   |   |    |             |
|           | Do we check the reasons for the non-conformance and put measures in place to stop it re-occurring?  |   |   |    |             |
|           | Do we measure the cost of the non-conformances to the company and highlight them to the employees on an ongoing basis?                                      |   |   |    |             |
|           | <b>DOCUMENTATION</b>  |   |   |    |             |
|           | <b>Required Documents</b>   |   |   |    |             |
|           | Documents to identify and remedy any conditions that could adversely affect the quality of the product or the production processes.                         |   |   |    |             |
|           | <b>Typical forms required</b>   |   |   |    |             |
|           | Non-conformance reports   |   |   |    |             |
|           | Management review reports   |   |   |    |             |
|           |   |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>   |   |   |    |             |
|           |   |   |   |    |             |
|           |   |   |   |    |             |
| <b>16</b> | <b>CALIBRATION AND VALIDATION OF MEASURING, INSPECTION AND TESTING EQUIPMENT</b>  |   |   |    |             |
|           | Is there a calibration schedule for all measuring or shape acceptance devices used in fabrication?  |   |   |    |             |

| Clause    | Quality Requirements   | Y | N | NA | ACTION PLAN |
|-----------|--|---|---|----|-------------|
|           | Does it list out the original equipment, the tolerance allowed, frequency of calibration and define the calibration status of each item?                     |   |   |    |             |
|           | Do we prove the calibration status of each item?   |   |   |    |             |
|           | <b>DOCUMENTATION</b>   |   |   |    |             |
|           | <b>Required Documents</b>  |   |   |    |             |
|           | Included in the documented process for the identification, control, maintenance and calibration (where relevant) of all production and inspection equipment. |   |   |    |             |
|           | Calibration and verification schedules   |   |   |    |             |
|           | <b>Typical forms required</b>  |   |   |    |             |
|           | Records of calibration and validation tests  |   |   |    |             |
|           | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|           |  |   |   |    |             |
| <b>17</b> | <b>IDENTIFICATION AND TRACEABILITY</b>   |   |   |    |             |
|           | Where appropriate, is identification maintained throughout the manufacturing process?  |   |   |    |             |
|           | Where appropriate, is traceability maintained throughout the manufacturing process?  |   |   |    |             |
|           | Whenever the identification and/or traceability are required, do the arrangements include (when necessary):  |   |   |    |             |
|           | • production plans?  |   |   |    |             |
|           | • routing cards?   |   |   |    |             |
|           | • record of weld locations in construction?  |   |   |    |             |
|           | • weld marking, stamping, labels etc.?   |   |   |    |             |

| Clause | Quality Requirements   | Y | N | NA | ACTION PLAN |
|--------|--|---|---|----|-------------|
|        | • traceability (for fully mechanised and automatic equipment including welder)?                                      |   |   |    |             |
|        | • welding operator to specific welds?  |   |   |    |             |
|        | • welder and procedure approvals?  |   |   |    |             |
|        | • NDT procedures and personnel?  |   |   |    |             |
|        | • welding consumables (e.g. type, batch or cast numbers)?  |   |   |    |             |
|        | • parent materials (e.g. type, batch)?   |   |   |    |             |
|        | • location of repairs?   |   |   |    |             |
|        | • location of temporary attachments?   |   |   |    |             |
|        | • WPS to specific welds?   |   |   |    |             |
|        | Do we use a written procedure for identification and/or traceability when this is required by contract requirements? |   |   |    |             |
|        | <b>DOCUMENTATION</b>   |   |   |    |             |
|        | <b>Required Documents</b>  |   |   |    |             |
|        | Documents, when required, to ensure identification and traceability of the welding operations.                       |   |   |    |             |
|        | <b>Typical forms required</b>  |   |   |    |             |
|        | Traceability records (when required)   |   |   |    |             |
|        | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|        |  |   |   |    |             |
|        |  |   |   |    |             |

| Clause | Quality Requirements  | Y | N | NA | ACTION PLAN |
|--------|---|---|---|----|-------------|
| 18     | <b>QUALITY RECORDS</b>  |   |   |    |             |
|        | Are requirements for records identified at the requirement/technical review?  |   |   |    |             |
|        | Do we have a procedure for controlling data that must be collected, verifying it and collating it?                    |   |   |    |             |
|        | Does the procedure incorporate data and records required from subcontractors?   |   |   |    |             |
|        | Is the record package properly filed and stored so as to be retrievable at any time during the 5-year storage period? |   |   |    |             |
|        | Do the quality records include, according to the contract requirements and/or when necessary, the following:          |   |   |    |             |
|        | • Requirement/technical review?   |   |   |    |             |
|        | • materials certificates?   |   |   |    |             |
|        | • consumables certificates?   |   |   |    |             |
|        | • WPSs  |   |   |    |             |
|        | • WPQRs   |   |   |    |             |
|        | • welder or welding operator approval certificates?   |   |   |    |             |
|        | • NDT personnel certificates?   |   |   |    |             |
|        | • Manufacturers Data Certificate of Compliance?   |   |   |    |             |
|        | • heat treatment and procedure specification?   |   |   |    |             |
|        | • NDT and destructive testing procedures and reports?   |   |   |    |             |

| Clause | Quality Requirements   | Y | N | NA | ACTION PLAN |
|--------|--|---|---|----|-------------|
|        | • dimensional reports?   |   |   |    |             |
|        | • repairs and non-conformity reports?  |   |   |    |             |
|        | • production plan?   |   |   |    |             |
|        | • equipment maintenance record   |   |   |    |             |
|        | Are quality records retained for a minimum period of 5 years in absence of any other specified requirements? |   |   |    |             |
|        |  |   |   |    |             |
|        | <b>DOCUMENTATION</b>   |   |   |    |             |
|        | <b>Required Documents</b>  |   |   |    |             |
|        | Included in the document for document control.   |   |   |    |             |
|        | <b>Typical forms required</b>  |   |   |    |             |
|        | Traceability records (when required)   |   |   |    |             |
|        | <b>IIW Manufacturer Certification Scheme (Additional information)</b>  |   |   |    |             |
|        |  |   |   |    |             |
|        |  |   |   |    |             |