美 特 鋁 質 有 限 公 司
MIDI ALUMINIUM FABRICATOR LTD.

工程指示 / 要求簡箋(E.I.)

工程指示編號：EI/ 9466 /18　　修改版次：

工程編號 ：J836　　工程名稱 ：日出康城7期平台

工程項目 ：Welding Procedure 測試

收件人 ：Maggie Lor　　發件人 ：李機鵬　　日 期 ：2018/6/25

☐要求提供 / ☑確認 事項 ：

( ) 初步鋁料 B.M.　　( ) 加工拆圖，然後生產　　( ) 尺寸表

( ) 正式鋁料 B.M.　　( ) 技術上資料 / 指示　　( ) 報價

( ) 配件 B.M.　　( ) 樣辦或貨品說明書　　( ) 分判合約

( ) 其他 ：_____

內容 ：

煩請為此工程項目安排 Welding Procedure.

Welder : Fillet Weld 2人 (暫定)

Butt Weld 1人

附上此工程之 Welding Specification 以作參閱.

請在 2018/7/9 前完成上列要求。

附有關圖紙 / 文件 ：

以上項目為:

☐ 原合約工程包　　☐ 原合約工程加 / 減賬　　☐ 新工程報價

原因 :-_____

分發東莞各部門 ：

( )生產技術總監☐連附件 ( )技術部 ☐連附件 ( )生產部 ☐連附件 ( )機械設計部☐連附件

( )採購部 ☐連附件 ( )生產統籌部☐連附件

( )質檢部 ☐連附件 ( )會計部 ☐連附件 ( )報關組 ☐連附件 ( )其他 _____☐連附件

分發香港各部門 ：

( )行政部☐連附件 ( )會計部☐連附件 ( )統籌部☐連附件 ( )工程部地盤科文☐連附件

( )採購部☐連附件 ( )QS 部 ☐連附件 ( )維修部☐連附件 ( )其他 _____☐連附件

傳遞編號：

發件人簽署：

項目經理簽署：

9 WORKMANSHIP – WELDING

9.1 General

9.1.1 Arc Welding

Arc welding of metallic material is to comply with BS EN 1011-1 and BS EN 1011-2 as appropriate, together with clauses contained in this Section.

9.1.2 Welding Technologist

Welding is to be carried out under the direction of a certified International Welding Technologist (IWT) with appropriate qualifications, experience or training as described in BS EN ISO 3834-5. The tasks and responsibilities of such persons shall be clearly defined.

In the circumstances where a certified IWT is not available, a certified CSWIP Welding Inspector (Level 2) or AWS Welding Inspector (WI) and higher level with at least 5 years' experiences in steelwork fabrication and erection will be considered. The qualification certificates and resume of such personnel shall be submitted for Architect's review and approval.

9.1.3 Quality requirements

The Steelwork Contractor's system for the management of welding shall comply with BS EN ISO 3834-3.

All welding documentation (welder qualification certificates, welding-procedure qualification records, welding procedure specifications and associated work instructions) shall be reviewed for applicability by the person responsible for welding coordination (welding coordinator).

The manufacturer and Steelwork Contractor shall have at their disposal sufficient and competent personnel for the planning, performing and supervising of the welding production according to specified requirements.

9.2 Welding Procedures

9.2.1 Approval of Welding Procedures

Welding procedure trials and the qualification records according to BS EN ISO 15614-1 shall be witnessed and endorsed by an Examiner/Examining Body.

Witnessing of procedures shall be undertaken by approved inspectors to BS EN ISO 9712 as a minimum and approval by an approved certified IWT or its alternative as stipulated in Clause 9.1.2 as a minimum.

Previous welding procedure approvals to BS EN ISO 15614 or former national standards may be considered at contract stage and agreed between the contracting parties, providing that the intent of the technical requirements is satisfied and the previous procedure approvals are relevant to the application and production work on which they are to be employed. Where applicable the WPS(s) shall be

submitted for review by the Architect at least 2 weeks prior to the start of production.

Documents required to support a WPQR(s) are as follows:

- WPAR(s)
- Complete mechanical test results
- Complete non-destructive test results
- Original material certificates (which should have either a full chemical analysis or the carbon equivalent)
- Consumable certificates (if available)

Summary documents are not acceptable.

Notified fillet welds, partial penetration welds, full strength butt welds and tee butt welds subject to tensile loads > 0.5 Ys, tests shall be completed by additional cruciform test performed in accordance with BS EN ISO 9018.

9.2.2 Preparation of Welding Procedure Specifications

Written welding procedure specifications (WPSs) shall be available in accordance with BS EN ISO 15609-1. They shall comply with the guidance of BS EN 1011-2:2001, Annex C, Method A for the avoidance of hydrogen cracking. Consideration shall be made to the requirements in Annex D of BS EN 1011-2:2001 to ensure that there is adequate toughness in the heat-affected zone (HAZ) of the weld. HAZ toughness shall be as a minimum be equivalent to the parent steel specification.

WPS shall ensure that the range of qualification is within the requirements of Section 8 in BS EN ISO 15614-1:2004. In addition to Section 8 of BS EN ISO 15614-1, carbon equivalent is considered an essential variable (Note). Any change in the carbon equivalent from that given in the WPQR > + 0.01% and the production material and the procedure will require additional approval. Reduction in the recorded carbon equivalent level for production when compared to the recorded carbon equivalent in the WPQR will not require additional approval.

All WPS shall be reviewed and approved by the IWT before being used in production.

Where WPS(s) are based on previously approved WPQR(s) they shall be submitted to the Examiner/Examining Body for verification of compliance with BS EN ISO 15614-1 and BS EN 1011-2.

Note: The suitability of WPS for the steel to be welded includes the consideration of the actual Carbon Equivalent (CE) of the steel if this differs from the CE value recorded in the WPQR.

9.2.3 Charpy V-notch Impact Test

Shall be included, either to BS EN 10045-1, BS EN ISO 148-1 or as instructed by the Architect.

9.2.4 Application of Welding Procedure Specifications

Appropriate work instructions shall be produced from the WPQR(s) under the authority of the welding coordinator. The work instructions shall be either WPS(s) or contain all the relevant information required from the WPS in other formats suitable to the Steelwork Contractor's system. They shall be provided to the welder or welding operator prior to the commencement of welding and shall be made available to the Architect, Employer or Inspection Authority on request and shall include a cross-reference to the WPS upon which they are based. Simple work instructions with minimal information are not acceptable.

9.3 Welder Qualification

9.3.1 Testing

Welders shall be tested to meet the requirements as given in BS EN 287-1 or BS EN ISO 9606-1.

9.3.2 Certification

Welder testing shall be witnessed and certificates approved/endorsed by an Independent Inspection Authority or Examiner/Examining Body.

9.3.3 Period of Validity

The period of validity of the welder's qualification shall comply with Section 9 of BS EN 287-1:2004 or BS EN ISO 9606-1.

9.3.4 Limitations

Welders shall work within the stipulated limitations as given in BS EN 287-1 or BS EN ISO 9606-1 at all times. Welds completed by welders found to be working outside stated limitations may be required to be removed.

9.4 Welding Consumables

Shall be used in accordance with the manufacturer's recommendations.

9.5 Assembly

9.5.1 Fit-up

Joints shall be prepared in accordance with BS EN ISO 9692-1 and BS EN ISO 9692-2 and fitted up to the dimensional accuracy required by the WPS, depending on the process to be used, to ensure that the quality in BS EN ISO 5817, level B is satisfied. Precautions shall be taken to ensure cleanliness of the connection prior to welding.

9.5.2 Jigs

Fabrications assembled in jigs may be completely welded in the jig, or may be removed from the jig after tack welding. It is the responsibility of the Steelwork Contractor to ensure the welds used before removal are adequate.

9.5.3 Tack Welding

Tack welds complying with BS EN 1011-1 and BS EN 1011-2 may be used provided:

(i) they are laid in an area to be welded and are thoroughly removed by grinding or gouging such that the subsequent welding is unaffected; or

(ii) they are undertaken by a welder qualified as in Clause 9.3 as short length normal welds of a length at least four times the thickness of the thicker part being joined, or 50mm whichever is the greater. The welding procedure shall comply with Clause 9.2; or

(iii) they are undertaken by a welder qualified as in Clause 9.3 and the welding procedure complies with Clause 9.2, and the tack is fully re-melted during subsequent welding (this will need to be substantiated by a welding procedure); or

(iv) they are located away from zones where subsequent welding is to take place and in a zone where only compressive forces are present in service.

9.5.4 Distortion

Welding procedures and sequence of fabrication are to be such that distortion is controlled and reduced to a minimum. But in any case, distortion shall not exceed the tolerances set out in Clause 8.7 of this Specification unless otherwise agreed with the Architect.

9.5.5 Temporary Attachments

Welding of temporary attachments required for fabrication or erection shall comply with BS EN 1011-1 and BS EN 1011-2 and shall be made in accordance with the requirements for a permanent weld and inspected.

9.5.6 Run-on and Run-off Plates

Where possible, use run-on and run-off plates in making butt welds to ensure full throat thickness at the ends. They are to comply with the following requirements:

(i) The Specification for the plates is to be identical to that for the material being welded.

(ii) The plates, having a sufficient length to prevent craters due to the stoppage of the weld, are to be prepared in the same profile as the parts being joined.

(iii) After completion of welding, the plates are to be removed by cutting. The surfaces where they were attached are to be ground smooth and inspected for cracks.

9.5.7 Castellated Beams

Welding is to comply with this Specification.

9.5.8 Production Test Plates

Where production test plates are specified for test purposes they shall be clamped in-line with the joint. The grade and quality of material, carbon equivalent and rolling direction shall match the parent plate, but need not be cut from the same plate or cast.

The production test plates shall meet the requirements of BS EN ISO 15614-1 for tensile, impacts and hardness unless otherwise agreed with the Architect.

9.6 Shear Stud Welding

9.6.1 Method

Fix shear studs in accordance with the manufacturer's recommendations for materials, procedures and equipment. Adequate return earth connections shall be made local to the area being stud welded. The local area around where the stud is to be welded shall be free of standing water before commencement of welding. The welding shall comply with BS EN ISO 14555.

If the studs are to be welded by other than drawn arc and this has not been indicated on the Drawings, the Architect shall be notified. Unless agreed otherwise by the Architect, the size of fillet weld shall be chosen such that the full tension capacity of the stud can be developed.

9.6.2 Trial Welding

Before commencement of the Works, carry out trial welding of studs to demonstrate the suitability of the proposed welding system and equipment. The trials shall be made using the proposed procedures and on samples of materials representative of those to be used in the work (carbon equivalent, grade and thickness). Test a minimum of ten studs in the trial.

During the work, at the start of each shift, a minimum of two trial welds are to be undertaken by each welder. If either of these trial studs fails a bend test in accordance with Clause 9.6.4, then further trials shall be conducted until satisfactory performance is established.

9.6.3 Visual Inspection

Visually inspect trial welded studs. They are to exhibit full 360 degree 'flash'. See also Clause 12.6.1.

9.6.4 Bend Test

Subject trial welded studs to a 30-degree bend test according to BS EN ISO 14555.

9.7 Removal of Slag

Remove slag by light hammering, wire brushing or other methods that do not deform the surface of the weld.