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ماقصه تامین، ساخت و نصب انکلت فلزی احداث کارخانه کنسانتره به ظرفیت ۲۵۰٬۰۰۰ مزار تن

شركت رابسبران فولاد اصفهان

مومت شاره ۱

مشخصات فني

مهروامصاء ييانكار

مناقصة مامين، ساخت ونصب اسكلت فلزى احداث كارخانه كنسانشرويه خرفت ٢٥٠، ١٣٠٠ بنرارتن المساحر المراداد ١٢٠٢/٢٠

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Steel Works, Site Fabrication and Erection of Steel Structures

¹. Materials

All material specified herein may be substituted by approved equivalents. Written approval of the Engineer must be obtained for any substitute materials prior to the fabrication

Structural Steel shall conform to the requirements of DIN 1.10,100 and 1910. STTY-T. Ultrasonic testing of plate material $1 \pm mm$ and over in thickness shall be performed in accordance with ASTM A $\pm \pi \circ$.

Structural tubing shall conform to ASTM Aov. Steel pipe shall conform to ASTM Aov, Type E or S Grade B.

Grating shall be composed of main steel bars ".mm x "mm at ".mm pitch, all welded type. All grating shall be hot-dipped galvanized in accordance with ASTM AVYT, with a minimum of VTT gr/mT $(\gamma, \circ \text{ oz/ft})$ zinc. Grating fasteners shall be minimum four galvanized bent clip type anchors per each square meter of grating panels. The anchors may not require any holes or studs in the grating or supporting steel. Where shown on the drawings, grating shall be tack welded and touch-up galvanized in place. Maximum weight of removable sections shall be $\forall \cdot$ kg.

The following locations shall be trim banded, excepted (f) which shall be load carrying banded.

- a) Open ends of grating at head of ladder approach to platform
- b) Open ends of grating at head of staircase where nosing is not supplied
- c) All openings in grating with dimension <code>\o.mm</code> or over, with <code>\o.mmx</code> mm bands
- d) All hinged sections
- e) Grating panels with four cross bars or less
- f) All cutouts having unsupported bearing bars

Stair treads shall be of serrated grating with standard nosing unless otherwise specified on the drawings. The cross section bearing bars shall be $\gamma \cdot mmx^{\gamma}mm$ and they shall be spaced $\gamma \cdot mm$ center to center.

Checkered plate flooring shall be of hot-dip galvanized carbon steel conforming to ASTM A[£][£]¹. The steel sheet shall be coated with a commercial zinc coating of $\sqrt{\gamma}$ gr/m^{γ} (γ , \circ , z/ft^{γ}) conforming to ASTM Aoro, coating designation G Tr. Floor plates shall be nonslip pattern, Amm thick plate with

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approximately `, omm pattern projection above plain plate, Drain holes `omm diameter shall be provided for each two square meters of area, with a minimum of one hole per panel. Checkered plates shall be furnished with the dimensions indicated on the designs drawings or purchase orders. Openings dimensioned on the design drawings shall be provided by the Fabricator. Unidimensional openings shall be cut in field.

Common (machine) bolts shall conform to ASTM $A^{r} \cdot \forall$ Grade A or alterative equivalent. Bolts with square heads and /or square nuts shall not be used. Washers are not required with common bolts.

High strength bolts shall conform to ASTM $A^{r\gamma \circ}$ specifications or alternative equivalent. One high strength bolt assembly shall consist of one heavy semi-finished hexagon structural bolt and one heavy semi-finished hexagon nut. Nuts for either common type or high strength type shall conform to ASTM Aorr or alternative equivalent. Hardened washers are required with high strength bolts and shall conform to ASTM $F^{\xi \gamma \gamma}$ or alternative equivalent. Where the surface of bolted parts in contact with the bolt head or nut have a slope of more than 1:7. with respect to a plane normal to the bolt axis, a smooth beveled washer shall be used to compensate for the lack of parallelism.

All bolts, nuts and washers shall be galvanized in accordance with ASTM FAV), considering SC[£] as the service condition.

Quantities shall include γ , extra per size and length for both common and high strength bolt assemblies to cover requirements for fit-up and erection.

Turnbuckle and clevis material shall be to DIN $St^{\gamma\gamma}$ with unified coarse class ${}^{\gamma}B$ thread and metric dimensions. The load carrying capacity shall conform to AISC requirements. All turnbuckles and clevises shall be galvanized in accordance with ASTM F^{AV} , considering SC^{ξ} as the service condition.

Steel roofing and siding shall comply with the "Construction Specification for Corrugated Steel Roofing & Siding, "Section F part 7".

The electrodes used for welding by manual process shall be E^{\vee} complying and be coded in accordance with AWS and shall be approved by the Engineer. For secondary members connections E¹. electrodes can be used with the approval of the Engineer. The AWS D\,\ requirement shall include limitations on the maximum size of electrodes The weld metal deposited by an automatic or semiautomatic process shall have mechanical properties not less than minimum specified for the weld metal

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deposited by electrodes complying with AWS except where otherwise specified in the standard for the particular application. Electrodes shall be stored in their original packets or cartons in a dry place adequately protected from weather effects.

***** Steel Construction Work Procedure

The following activities/items for "main steel structures" are to be considered:

- Foundation anchor bolts system.
- Main building columns
- Secondary posts
- Vertical bracings
- Crane runways (including rails, fastenings, plates and stoppers)
- Roof structures
- Cladding supporting structures
- Connecting bolts and plates
- Shop / erection drawings relevant to the above mentioned items

The following activities/items for "Secondary Steel Structures (connected to steel buildings)" are to be considered:

- Walkways
- Ladders
- Handrails
- Connecting bolts and plates
- Shop / erection drawings relevant to the above mentioned items

The following activities/items for "roofing and cladding" are to be considered:

- Single sheeting, insulated panels
- Translucent sheets
- Flashing and metal sheets
- Fasteners
- Gutters and Downpipes
- Doors and gates

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- Natural ventilation system (air inlet and roof static outlet)
- Shop/erection drawings relevant to the above mentioned items.
- *****. Fabrication

۳, ۱.General

Workmanship on structural steelwork shall be in accordance with AISC (American Institute of Steel Construction), Code of Standard Practice for Steel Buildings and Bridges and this specification.

All material, before and after fabrication, shall be straight unless required to be of curvilinear form and shall be free from twists.

End of beams, channels and other parts abutting against or upon other parts shall be cut to exact lengths, true and square, so as to provide a good bed or joint as the case may be.

Edges of web plates shall be flush with the faces of the flange angles, and stiffeners shall fit closely against the flanges.

All bolts and eye rods shall be formed in one piece.

Structures partly or wholly supported by pressure vessels shall be bolted to cleats or brackets fabricated and assembled by the vessel Construction Contractor, except where otherwise specified on the drawings.

Radius of re-entrant flame cuts shall be as large as possible and not less than \uparrow mm except for small members where this tolerance is impracticable.

The Construction Contractor shall foresee provisions for making job at high elevations safer, e.g., by providing temporary sea folding fastened to steel structure.

Minimum inspection data requirements are:

- 1. Certificates of material or mechanical tests results
- ۲. Welding procedure records
- ^r. Welder's qualification records
- [£]. Non-destructive tests of weldment results
- °. Visual and dimension control records

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- ¹. Coating / Painting / galvanization checks records
- \vee . Checks of the identifications marks records

γ, γ . Applicable Codes

All fabrication shall be in accordance with the Code of Standard Practice for Steel Building and Bridges of the American Institute of Steel Construction and the American Welding Society, Structural Welding Code D¹,¹, except as modified herein. In the event of a conflict between this specification and the codes referred to, this specification shall govern.

۳, ۳. **Preassembly**

Structural members shall be fabricated and assembled in the Construction Contractor's yard to the greatest reasonable extent possible in order to check the accuracy of the fabricated pieces.

^γ, ^ε.Cutting & Beveling

Shearing, flame cutting, clipping and beveling shall be done carefully and accurately. All edges shall be left free of slag. Any beveled edge that has been damaged shall be restored to the minimum tolerances. Sharp edges, fillets and corners shall be rounded or smoothed by grinding with a minimum radius of ۲mm.

۳, •. Splicing

Splices in main members or parts thereof, including columns, girders and individual truss members shall be as shown on the design drawings and shall be made with complete penetration butt welds.

When splices for girder webs and flange plates cannot be avoided because of extreme length, such splices shall be located as remote as possible from point of maximum stress as approved by the Engineer.

For splices of beams, the number of splice welds and their locations, with respect to beam ends, shall be directed by design function of the beam(s) under consideration. Generally, in cantilever beams there shall be no splice weld located closer to the point of support than one-half the cantilever span. For beams spanning between supports, there shall be no splice weld in the center one-third of the span distance or in the one-eighth of span segment of the beam nearest to any support. No two splice welds shall be located closer together than two times the beam depth, or minimum of *`*m, whichever is smaller.

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۳,٦.**Connections**

General

The Construction Contractor shall provide all holes required for installation of equipment, as indicated on the drawings.

For site-fabricated structures, the Construction Contractor shall furnish all erection bolts and washers, including all those necessary to connect steelwork to other items and shall provide beveled washers for sloped surfaces.

All field connections should be bolted, unless otherwise specified on the drawings.

End bearing stiffeners of girders shall be welded to top and bottom flanges and web. Intermediate stiffeners shall be welded to compression flange and web and shall be cut back from the tension flange. All stiffeners shall have inside corners clipped to prevent weld intersections with fillet weld connecting girder webs and flange.

All columns or other main compressive members shall have milled ends for full bearing on based plates on cap plates and at splices.

Care shall be taken to ensure that the erection clearances specified on the drawings are adhered to.

For sliding connection, Construction Contractor shall provide two nuts per bolt.

Galvanized grating panels shall be connected with minimum four galvanized clips per each square meter to supports.

Bolted Connections

All holes for bolted connections shall be of a diameter ^Ymm larger than the bolts used, unless otherwise indicated on the drawings.

All holes shall be accurately marked off from template on corresponding plate and drilled at right angles to the surface of the metal. Punching is permitted for plates ``mm thick and under. Under no circumstances holes to be formed by a gas cutting process.

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Holes shall be cleaned from burrs or rough edges and countersunk where required. No drifting shall be allowed.

Holes through more than one thickness of material for members such as built-up columns and girder flanges shall, where possible, be drilled after the members are assembled or tightly clamped or bolted together. Punching may be permitted before assembly provided the holes are punched "mm less in diameter than the required size and reamed after assembly to the full diameter.

When holes are drilled in one operation through two or more separable parts, these parts shall be separated after drilling and the burrs removed.

Holes shall not be enlarged by burning. Enlarging of holes shall be by reaming only and then with the approval of the Engineer.

Bolted connections shall be friction type with high strength bolts, unless normal bolts are noted on the drawings. Where normal bolts are specified, bearing type connections shall be used with bolt threads excluded from the shear planes. All bolted connections shall have minimum of two <code>\``mm</code> bolts unless otherwise noted on the drawings.

Bolts shall be driven accurately into the holes without damaging the thread. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Unfinished bolts transmitting shear shall be threaded to such a length that no more than one thread will be within the grip of the structural members. The bolts shall be of a length that will extent entirely through but no more than \mbox{mm} beyond the nuts. Bolts heads and nuts shall be drawn tight against the work with a suitable wrench not less than $\cdot, \cdot \circ$ m long.

Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads and nuts of bolts a satisfactory bearing. The threaded portion of each bolt shall project through the nut at least one thread.

Where a tubular member is drilled to take bolts or studs, provision shall be made to prevent the access of moisture to the interior of the tube. For example, a transverse sleeve may be inserted where a bolt passes through a tube.

Welded Connections

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All welding shall comply with applicable codes, standards and specifications. Construction Contractor shall qualify his welders, welding operators and the procedure specification in the presence of Engineer in accordance with the applicable code, standard or specification. Before any welding work is started, certified copies of qualification test records for each welder, welding operator, and welding procedure specifications shall be submitted to the Engineer to prove that all welders, welding operators and procedure specifications to be used on the job are properly and currently qualified in accordance with the governing code(s).

Butt welded joints in parts of built-up members shall be ground smooth at intersections to ensure tight fit of parts.

Fusion faces shall be free from irregularities which would interface with the deposition of weld metal, or which might cause other defects in the welded joint.

All full penetration groove welds shall be given a minimum of ^{Yo} percent inspection by the Construction Contractor using non-destructive tests as described in AWS D1,1. Extent and type of testing, Radiography or ultrasonic, shall be as decided by the Engineer.

A minimum of γ , of fillet welds joining main structural elements in built-up sections including columns and girders, shall be inspected by the Construction Contractor at random by magnetic particle as per ASTM $E^{\vee, 9}$ or by dye penetration test. Extent of testing shall be as directed by the Engineer.

The Construction Contractor shall maintain records of all tests and the qualification of testing personnel. The records shall be submitted to the Engineer. Rectification of the unaccepted welds shall be performed in accordance with section r, \forall of AWSD¹, ¹.

Welder Qualification

The ability of welders and welding operators to make sound welds within the scope of this specification shall be tested in accordance with the applicable code(s), in the presence of the Engineer. Welders qualification tests must be made in accordance with the welding procedure qualified for production welds.

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Pipe welders shall be qualified by welding specimens of required thickness with weld groove orientation as stipulated in the applicable code(s).

Welders who are qualified to make groove welds are also qualified to make fillet welds in all thicknesses. Welders who are tested for fillet welds shall be qualified to make fillet welds only. Radiographic examination may be required for any welder qualification test specimen except fillet weld. If radiographic examination of the test welds shows any weld defect which fail to conform to the applicable standards or which in the opinion of the Engineer would cause the specimen to fail the bend test, the specimen may be rejected without further test.

Procedure Qualifications

The Construction Contractor shall prepare and submit for approval welding procedures for all field welds, and shall not proceed with fabrication until approval is received.

All welding procedures to be followed in the fabrication of welds within the scope of this specification shall be developed by the Construction Contractor in accordance with the applicable code(s) and submitted to the Engineer for approval Data involved shall be recorded and submitted on forms as recommended in the applicable code(s).

Requirements regarding changes of essential variables concerning the procedure requalification shall be strictly adhered to the governing code(s) for the procedure qualification test shall be clearly stated in all welding procedure specifications.

Data involved in the qualification test shall be recorded on forms recommended in the applicable code(s). The governing code(s) for the qualification test shall be shown in all qualification test records. Those welding procedures which have been approved by the Engineer or its authorized inspection authority, shall not be requalified, provided that such procedures are fit for using in the work within the scope of this section.

Period of Effectiveness

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Pertinent provision of the applicable code shall apply to the period of effectiveness of any welder qualification and the requalification of any welder when there is specified reasons to question his ability to make welds that meet the requirements of the applicable code(s).

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Applicable Codes

Welding shall be carried out in accordance with the applicable codes listed below:

- a. AWS D1,1, Structural Welding Code.
- b. AWS A^Y,[£] Symbols for Welding, Bracing sand Non-destructive Examination.
- c. AWS A^r, Welding Terms and Definitions.

Column Bases and Caps

Column bases and caps, except when cut from material with true surfaces, shall be accurately machined over the bearing surfaces and shall be in effective contact with the end the column. A bearing face which is to be grouted direct to a foundation need not be machined if such face is true and parallel to the upper face. To facilitate grouting, holes shall be provided where necessary in column bases for the escape of air.

Draw in Diagonals

For light single angle bracing diagonals the following draws shall be allowed:

- For lengths up to \forall m, shorten \forall mm
- For lengths $\forall m$ to $\forall m$, shorten $\forall mm$ to $\forall mm$
- For length m to m, shorten m to m
- For length over *``*m, shorten *`*mm

Priming

Priming shall be performed in accordance with relevant project specifications.

Contact surfaces for field and shop connection using high strength bolts and parts to be encased in concrete (e.g., fireproofing concrete) shall be primed for corrosion prevention after fabrication. Priming of these parts shall be removed by wire brushing just before erection of steel members.

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For connections using high strength bolts, holes like contact surfaces shall be primed after fabrication, but oil, dirt, and other deleterious matter shall be removed from these parts.

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All enclosed surfaces of box members shall be completely sealed by oiling or coating with an approved bituminous paint or ends of all such members and tubes shall be closed by suitable metal plates welded in position.

Marking

All structural steel shall be prominently marked for identification in erection. The marking shall be stamped on each part and the depth of cut shall be at least \cdot, τ mm marking shall be performed near one of the ends of the part and shall include:

- Order Number
- Structural Identification Number
- Number of the Fabricator's Erection Drawing
- Part Identification Mark Number

Alternatively, marking may be stamped on r or ϵ mm thick steel plates, sized $r \cdot \text{mmx} \cdot \text{mm}$ which are tack welded to the part on the short sides of the plate.

٤. Erection

5.1.Protection of Existing Services and Installations

The Construction Contractor shall make himself familiar with the location of all services above and below ground and shall take all reasonable precautions to prevent damage thereto. No props or supports shall be attached or affixed to such services. The Construction Contractor shall be responsible for the safety of, and for any damage to installation and services as a consequence of his operations.

^٤, ۲. Plant and Equipment

The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the Engineer.

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٤,٣.**Setting Out**

The Construction Contractor shall be responsible for setting out the work and for accurate positioning, plumbing and leveling of all steelwork in accordance with the drawings to the Engineer's satisfaction. Variations in the finished overall dimensions of structural frames shall be within the limits of this section and permissible tolerances as permitted in AISC Code of Standard Practice.

٤,٤.Security During Erection

During erection, the work shall be securely bolted, or otherwise fastened, and if necessary temporarily braced, so as to make adequate provision for all erection stresses and conditions, including those due to erection equipment and its operations.

٤, °. Erection on Concrete Structures

Erection of steelwork shall not normally commence until concrete foundations and slabs have cured for a minimum of \forall days excepted at the discretion of the Engineer.

^٤,^٦.Storage and Handling

Steelwork at site shall be stored, handled, and erected in such a manner as not to subject it to excessive stressed and damages. All work during erections shall be securely bolted and, if the Engineer so directs, it shall be temporarily braced to resist erection stresses and conditions including those arising from erection equipment. No bolting or welding shall be executed until correct position and alignment has been obtained.

٤, ^v.Site Connections

Types of connections and bolts shall be as shown on the construction and shop drawings.

Bolting

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Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads and nuts of bolts a satisfactory bearing. The threaded portion of each bolt shall project through the nut at least one thread. For sliding connections, the nut shall be finger-tightened and back up $1/\tilde{r}$ turn, then a second nut shall be installed as a locking device.

All high strength bolts shall be tightened by the turn-of-nut method. Tightening may also be accomplished by turning the bolt head while holding the nut if required by clearances. Prior to tightening any bolts, there shall first be enough bolts brought to a sung-tight condition to insure that the joint surfaces are in good contact. Sung-tight is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Following this initial operation, bolts shall be placed in any remaining holes in the connection and brought to sung-tightness. All bolts shall now be tensioned by the applicable amount of nut rotation given in the table below. The tensioning shall progress systematically from the most rigid pat of the joint to its free edges.

Nut Rotation () from Sung Tight Condition			
	Disposition of Outer Faces of Bolted Parts		
Bolt-Length (as measured from underside of head to extreme end of bolt)	Bolt faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than ¹ : ⁷ • (beveled washers not used)	Both faces sloped not more than $i:i \cdot from$ normal to bolt axis (beveled washers not used)
Up to and including ٤ diameters	۱/۳turn	۱/۲ turn	۲/۳turn
Over [£] diameters but not exceeding ^A diameters	۱/۲ turn	۲/۳turn	o/٦turn
Over ^۸ diameters but not exceeding ۲ diameters	۲/۳turn	0/٦turn	۱ turn

Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by ¹/⁷ turn and less, the tolerance shall be ^{±30} degree, for bolts installed by ⁷/⁷ turn and more, the tolerance shall be ^{±45} degree.

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In addition to the requirements of above mentioned paragraph, the torque required for tightening the bolts shall not be less than the values given in the following table.

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Bolt Diameter (mm)	Required Tightening Torque (kg-m)	
١٢	٧,٣	
١ ٤	۱۲,۰	
17	11,0	
١ ٨	۲0,.	
۲.	٣٦,•	
۲۲	٥.,.	
۲٤	٦٣,٠	
۲۷	٩٢,٠	
۳.	۱۱۳,•	
٣٣	170,.	

The Construction Contractor shall mark all fastened bolts by paint. If a bolt is tightened to the required extent and then untightened, it will be rejected due to the damage to galvanization coating.

Welding

Unless otherwise specified in section (τ, τ, τ) , the Construction Contractor shall obtain prior approval of the Engineer for any welding done to pressure vessels.

£,A.Fabrication and Erection Tolerances

All completed work shall be exact to the dimensions required except as officially directed by the Engineer and confirmed in writing. Every piece of materials shall be free from contamination, twist and distortion. Rectification of distortions in welded structures shall be executed in a manner approved by and

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cannot be reused. Fabrication and erection tolerances shall be as permitted in the AISC Code of Standard Practice as follows:

A variation of •, Amm is permissible in the overall length of members with both ends finished for contact bearing. Definition of "finished" surfaces may be found in AISC Code of Standard Practice.

Members without ends finished for contact bearing, which are to be framed to other steel parts of the structure, may have a variation from the detailed length not greater than *\,*omm for members *\...*mm or less in length, and not greater than "mm for members over $91 \cdot mm$ in length.

Unless otherwise specified, structural members, whether of a single-rolled shape or built-up, may vary from straightness within the tolerances allowed for wide-flange shapes by ASTM A³, except that the tolerance on deviation from straightness of compression members is $\frac{1}{1000}$ of the axial length between points which are to be laterally supported.

Completed members should be free from twists, bends and open joints. Sharp kinks or bends are cause for rejection of material.

Beams and trusses detailed without specified camber are fabricated so that after erection any camber due to rolling or shop fabrication is upward.

Any permissible deviation in depths of girders may result in abrupt changes in depth at splices. Any such difference in depth at a bolted joint within the prescribed tolerances, is taken up by fill plates.

Tolerances in dimensions of welded structural members shall be as specified in the Code AWS D١,١.

Corrugated Steel Roofing & Siding

o, Materials

Roofing and Siding

Roofing and siding shall be in the form of sandwich panels or single sheets made of hot-dipped galvanized and prepainted steel sheet and polyurethane foam with $\xi \cdot kg/m^{r}$ density (for sandwich panels). Minimum thickness of sandwich panels shall be [£]·mm. Roofing and siding may be also in the form of translucent panels.

مناقصة مامين، ساخت ونصب اسكلت فلزى احداث كارخانه كنسانشرويه خرفت ٢٥٠، ١٣٠٠ بنرارتن المساحر المراداد ١٢٠٢/٢٠

شاره قرارداد: ۱۹۰۰/۲۰۰۲

All roofing, siding, and accessory items shall be milled from structural quality steel. The roofing and siding sheets shall be made of hot-dip galvanized carbon steel having a minimum yield point of YYA N/mm^{γ} conforming to ASTM A^{$\xi \xi \gamma$}, Grade A or equal.

Before forming, the steel sheet shall be coated with a commercial zinc coating of ۲٦٣ gr/m۲ conforming to ASTM A°[°], coating designation G[°], pretreated and coated with epoxy polyamide then painted with one coat of baked enameled polyester resin paint.

Trapezoidal corrugated galvanized steel roofing and siding shall have a minimum thickness of •, omm for sandwich panels and •, Aomm for single sheets conforming to ASTM ATTY.

Sandwich panels, single sheets and translucent panels shall be designed and fabricated for covering the minimum span of **..mm.

Flashing

Flashings are preformed steel shapes installed where roofing and siding terminates, e.g., corner, ridge, valley. They shall be galvanized and painted as specified for roofing and siding. The minimum thickness of flashing shapes shall be \cdot, \forall mm.

Translucent Panels

Translucent roofing panels shall be fiberglass-reinforced with a minimum tensile strength of Λ^{σ} N/mm⁷ measured in accordance with ASTM D¹ⁿ. Glass content shall be approximately ¹o[']. by weight obtained using the procedure of ASTM $D^{\gamma \circ \Lambda \xi}$. Panels shall be non-combustible with a maximum flame spread of \mathcal{V}° when tested according to ASTM $E^{\Lambda \xi}$.

Translucent panels shall be of the sizes shown on design drawings. The configuration shall match the roofing and siding. Finish shall be smooth and panels shall be protected with a polyvinyl fluoride film permanently bonded to the weather side. Color shall be frost with an approximate light transmission value of $\wedge \cdot /$ when tested in accordance with ASTM D) $\xi q \xi$.

Louvers

Louver blades shall be of galvanized and painted steel as specified for roofing and siding. Louver blades shall be of the sizes shown on the drawings. The minimum thickness shall be 1,7mm.

مناقصه تامین، ساخت و نصب اسکلت فلزی احداث کارخانه کنسانترو به خرفت ۲۵۰٬۰۰۰ بهزار تن

شاره قرارداد: ۲/۰۰۲/۱۹۰۰

Accessories

All sheet metal accessories shall be hot-dip galvanized steel as specified for roofing and siding.

Fasteners

Self-tapping screws shall have hardened corrosion – resistant hexagon or recessed slotted head and shall be of AISI type ξ , stainless steel and conform to ANSI B λ, τ, ξ . They shall be capable for withstanding a torque of γ N-m.

Washers shall be of AISI Type r,r stainless steel with synthetic rubber securely bonded to metal.

Closures

Closures shall be of rubber or synthetic rubber. Closure strips shall be closed cells and shall be cut or molded to the exact configuration of the siding or roofing panels. The closure strips shall be uniform in appearance and free of rubbles, cracks, and defects affecting serviceability.

Adhesive for use with closure strips shall be a type as recommended by the roofing and siding panel manufacturer.

Sealant

An approved poly isobutylene butyl preformed sealant tape or acrylic sealant for gun application may be used.

The sealant shall have a temperature serviceability range of $-1 \cdot C$ to $1 \cdot C$ and shall be installed in accordance with the manufacturer's instructions.

Storage and Handling

Roofing and siding panels, flashing material and louvers stored at the worksite before installation shall be stacked on platforms or pallets and covered with tarpaulins or other suitable covering to provide a weathertight enclosure. Translucent panels shall be stored indoors on edge.

Packaged materials shall be stored in their original unbroken package or container in a weathertight and dry place, until ready for installation.

مناقصه تامین، ساخت ونصب اسکلت فلزی احداث کارخانه کنسانترو به ظرفیت ۲۵۰٬۰۰۰ مزارتن

شاره قرارداد: ۲/۰۰۲/۱۹۰۰

°, Y.Erection

The structural framing and supporting members with windows, doors, louvers, roof vents, stacks, etc., shall be in place before the placing of roofing and siding is started. All work shall be erected square and in proper alignment and relationship to other work.

Placing Roofing and Siding

Supporting members shall be completely in place before the placing of roofing and siding is started. Panel sections shall be in full and firm contact with structural members.

Fastening Roofing and Siding

Panel sections shall be fastened to every structural member with mm self-tapping screws and washers at $\cdot \cdot mm$ maximum spacing.