Fiber Module Liner Installation Manual

驻马店恒瑞高温节能材料有限公司

HENGRUI H-TEMPERATURE ENERGY-SAVING MATERIALS CO.,LTD

1 Scope

1.1 Applicable scope

This document is only applicable to the installation and construction instructions of refractory materials for HENGRUI H-TEMPERATURE ENERGY-SAVING MATERIALS CO.,LTD

1.2 Compilation basis

1) Furnace refractory drawings

2) Installation instructions and manuals provided for refractory materials

1.3 Construction and Acceptance Standards

1）《 Code for Construction and Acceptance of Industrial Furnaces Buildings》GB50211

2）《Technical code for construction safety in petrochemical engineering》SH3505-1999

3）《Specification for the construction and acceptance of furnace brick lining engineering for petrochemical industry》SH3534--2001

4）HSE Management System and Execution Documents HSE

2 Construction preparation

2.1 Construction personnel on site should possess respective certification.

2.2 Set up one refractory material storeroom according to site layout.

2.3 Construction equipment is qualified during test run.

2.4 Possess survey instrument after computation.

2.5 Prepare construction plan and make technical introduction to workers.

2.6 Inspect raw materials for refractory materials that has time limit, entering site must after qualified.

2.67Inspect quality of furnace installation before lining and commence to work must has signature by relevant personnel.

3 Storage and Handling of Refractory Material

3.1 Material supplied

Main Material are as listed in Drawing & BOM.

3.2 Storage1) Material is supplied by Pallet, and these are stored in the warehouse, It must be carried to ensure that the refractory materials are kept dry at all time.

2) Do not tack refractory material too high (not more than 2 m), as most refractory material such as ceramic fiber, and Castable are soft and can be compressed and easily damaged.

3.3 Handling of Material

3) Any movement or transportation of refractory material must be in its original packing such as pallets, case, cartons , crates etc.

4) If any damages to cases occur, remedy action such as repair or replacement should be taken at once to prevent quality deterioration of product.

5) Do not throw the carton boxes, as most of the materials are soft and fragile and can be

Inspect quality of furnace installation before lining and commence to work must has signature by relevant personnel.damaged.

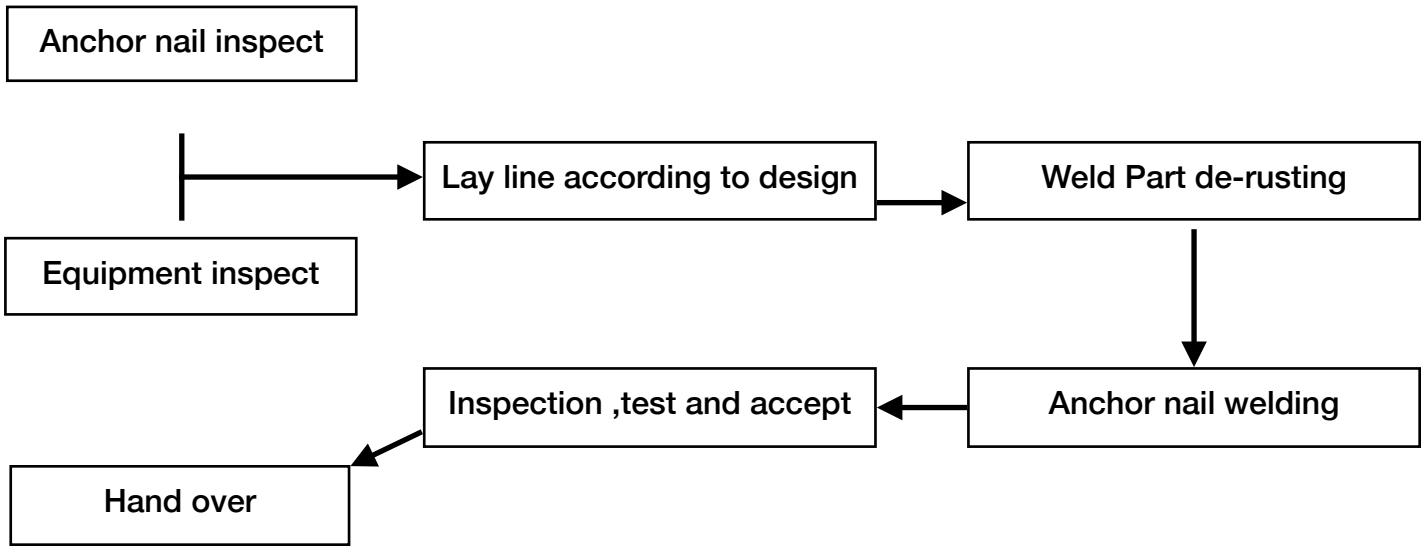
6) Do not remove material from the carton boxes until just before installation.

7) Remaining or loose materials are to be returned to cartons for storage or transportation from one location to another.

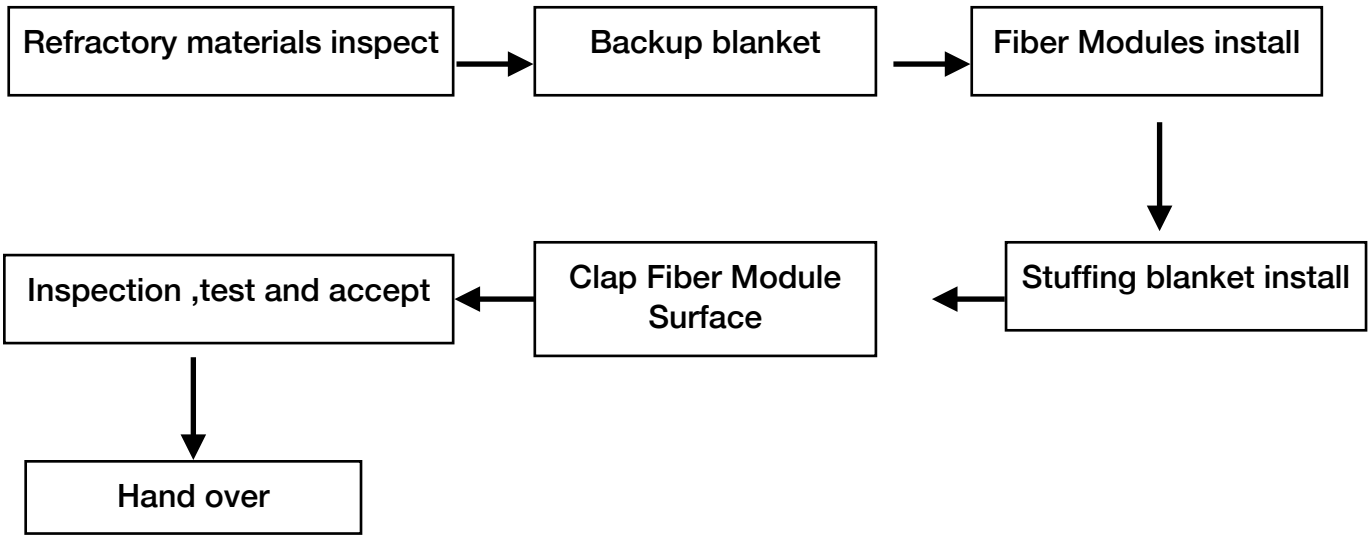
4 Construction procedure and quality control point

4.1 procedure

1） Anchor pin welding



2） Ceramic fiber Module installation



4.2 Quality control point

Fibre module installation quality control point

序号 No.	Control point	Type	Content	Principal
1	Raw material inspect	Witness	Material qualification	Technician
2	Furnace examine	Witness	Dimension size, verticality and smoothness	Quality inspecton
3	Anchor welding	Stop point	Weld quality and position	Quality inspector
4	Anchor alignment	Witness	Verticality	Technician
5	RCF module installation	Stop point	Depth and surface smoothness	Quality inspector
6	Handover	Witness		Technician

4.3 Construction Sequence

1.Removal of the original furnace lining;

2.Check equipment dimensions against the drawings;

3.Mark the positions of anchors according to the drawings. The positions of 3mm round steel anchors for layered installation shall be adjusted based on site conditions, while module anchors must strictly follow the drawing dimensions;

4.Remove rust from the welding positions of anchors on the inner wall of the furnace shell;

5.Weld the anchors;

6.According to the design drawings, carry out lining installation in the order of end wall → furnace roof → side wall → furnace bottom. Fiber installation requirements shall follow Sections 5.2 and 6.1;

7.For layered installation of ceramic fiber blankets in other areas, refer to Section 5.2-2);

8.Install aluminum foil and other materials as required in the drawings;

9.Remove packaging accessories of fiber modules and trim the surface;

10.Completion of ceramic fiber material installation.

Construction process and method

Construction process and method

5.1 Anchor welding and installation

1) Rust removal : Remove all rust, oil and other sundries on anchor nail weld point that need to be lined.

2) Confirming welding part on furnace sidewall according to design size by laying line before welding.

Set based on furnace centerline and developed to both sides.

3) Anchors should be welded to furnace wallboard with weld angle.

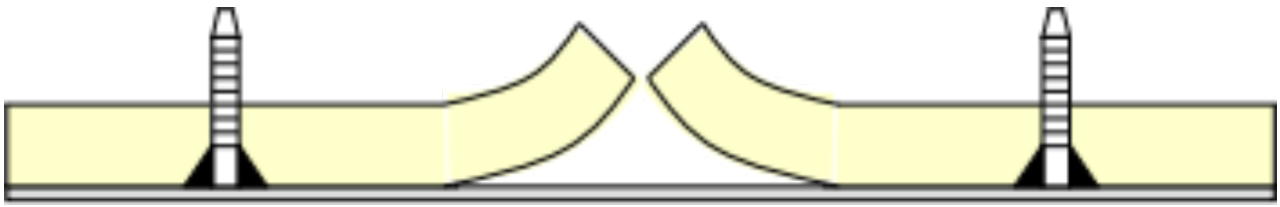
4) Anchor piece welding : No crack and undercut and be vertical to vessel sidewall. Inspect it by 0.5kg hammer in accordance with specification PS-F14after welding.

5) Anchor nail welding method : Anchor nail welding will all be operated by hand

5.2 Installation of fiber module

1) Protect the anchor stud thread when remove rust or weld by manual.

2) Connection between back up blanket should be close and tear by hand is forbidden.



3) U pins are generally used to fix strip blankets that are prone to falling off: after the strip blanket is placed in place, the U pin is vertically penetrated through the strip blanket and inserted into the mo dules. The insertion point must be located in the middle of the thickness of the strip blanket, close to 1/3 of the cold surface, with a spacing of about 600mm between each U pins.

4) Fiber modules on the furnace wall should be installed from bottom to top row by row according to the specified direction and items on design drawing.

5) According to the design specified thickness & material, fiber blankets should be installed between the two non expandable surfaces of fiber modules, also between fiber module and bricks or castable.

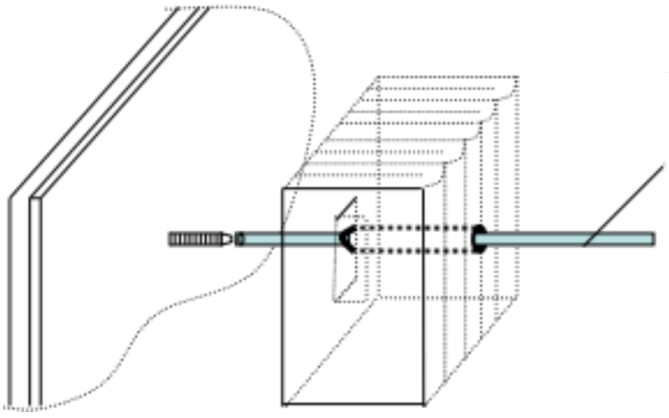
6) The installation of all fiber modules should be carefully carried out according to the design require ments, and the corners of the modules should not be damaged to ensure tight bonding at the corners after installation

7) Installation method and procedure of fibre modules

a) Wrapping and welding of stud

b) Protection removal, laid 25mm thick. back up blanket tightly and smoothly.

c) Put he guide tube through fiber module fix on stud.Push the fiber modules along the guide

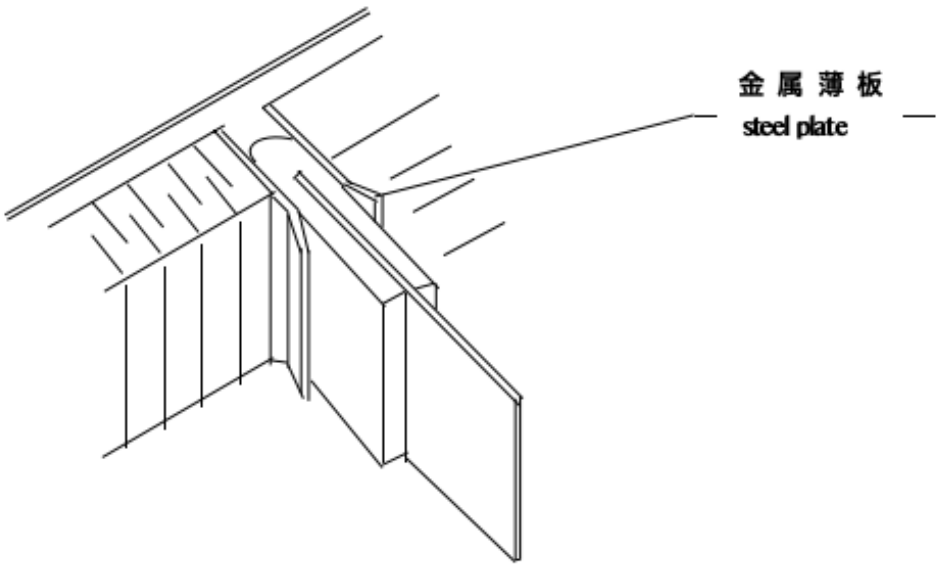


d) Put nut into spanner end(nut towards to anchor end), push it towards to anchor along tube among modules, until aim and screw down.

e) Installing every modules needs to adjust foursquare of modules, insure among modules tightness.

f) After a row of module or All of walls are finished, remove package of modules, inspect whether module surface is smooth.

g) If there are gap between module , use strip blanket repairing as follow :



h) Finally, lap module surface with wood plate, make module smooth and expand, insure among modules tightness.Quality standard and guarantee measures of lining

6.1 Quality standard

1) Allow deviation items

Quality standard and guarantee measures of lining

6.1 Quality standard

Lining material	Items		Allowable deviation（mm）
Anchor nail	Center distance between two nails		±2
	Center distance of two random nails		±5
Refractory brick	Expanding gap width		0～+3
	2000mmPlaneness for each 2000mm		5
	1000mmVerticality for each 1000mm		3
	Total height		±15
Castable	Thickness	50~150mm	±3
		50~150mm	±5
	2000mmPlaneness for each 2000mm		3
	1000mmVerticality for each 1000mm		3
	Total height		±15

2） Anchor nail welding : The welds shall be full and step less and free from crack, residue, arch pit and other defect.

3） Installation of fibre module : The surface shall be smooth and free from extruding corners and other defects.

4） Castable material work: The surface shall be smooth and free from crack and other defect. No empty sound if taped by hammer.

5） The brickwork shall be correction and close and smooth ; the plaster slot shall not more than 2mm.

6.2 Quality guarantee measure

1） Strengthen quality control.

2） Make technical, each procedure and lining work explanation before construction.

3） Control construction procedure strictly. Come into next procedure must after last procedure qualified.

4） Execute system of quality rewards and punishment.

5） Quality inspector and technician should take walk about inspection frequently and instruction workers in time.

5 HSE measure HSE

7.1 All safety activities shall be in accordance with proved safety procedure.

7.2 PPE

All personnel on site shall wear PPE, safety helmet, safety glasses, safety shoes (with steel sheet and insulation) and other protections.

7.3 Safety marking

1） Set caution mark of strictly prohibit beacon and no smoking at flammable, easy exploding and dangerous chemicals warehouse area.

2） Hoisting, radial, acid cleaning and dangerous work area in site should set temporary guard line and mark to prevent person and vehicle from passing.

3） Must shut former switch and hanging power cut symbol board during inspection and repair of distribution and switch box.

7.4 Construction electricity

1) The distribution method adopts "three phase and five wire system" and "three-level control and two level protection", and the person specially assigned for a task must lock the distribution and show the telephone number.

2) The copper core flexible wire is adopted as the protective zero conductor for the movable tools. The electric equipment protection of the second level shall use leakage circuit breaker.

3) The leakage breaker should match the electric equipments, and it is forbidden to substitute fuse for the breaker. The one switch and one fuse for one machine system will be carried out strictly.

4) 220V turn-on lamps are forbidden for use on the steel frame. 12v turn-on type lamps are used in the metal containers or in the damp environment. Drop light substation is the separation type, and the booster is forbidden to use as the drop light substation. The lamps have switches and leakage breakers.

5) The moveable electric equipment adopts the rubble flexible wire as power supply wire. The electric welding machine cable uses the YHS type copper core multiple flexible cable, for which the use of angle, flat and round bar are forbidden. The one time line of the electric welding machine will be less than 5m long.

6) All site equipment shall have static electricity grounding.1)

For scaffolding, confirm scaffolding plan according to main structure and construction process.

For large scaffolding, required sketch.

2) When scaffolding finishes, it will be inspected by the scaffolding responsible person of the HSE station, and the unqualified scaffolding will be hanged red tags and forbidden to use while the qualified will be hanged green tags for use.

3） Prohibit using unfinished scaffold and scaffold with “rejected scaffold ” . HSE station shall have regular inspection for scaffold. The unqualified scaffolding will be hanged red tags and forbidden to use while the qualified will be hanged green tags for use.

7.6 High working

1） For high working personnel shall have medical examination, and personnel with occupational taboo shall not have high working. When working, shall have light clothing, prohibit wearing shoes with hard sole and iron sole and have safety belt. Working surface shall have reliable protection, access and handrail. Workers shall pass along access and prohibit climbing slings or scaffolding rod. Prohibit tool bags, tools and materials used by high working personnel being thrown. Cutting in high shall be done on operation platform to avoid cut objects falling and hurting someone below.

2） When working in rainy, snow and fog, ice, snow or water shall be cleaned. When working high at night, full lighting system shall be mount. When working with wind speed over 10m/s or lightning and fog, open work shall be prohibited.

3） When have cross work, steel scaffold board shall be set for isolation.

7.7 Lifting work

1） Lifter shall have safety qualification certificate and be familiar with performance of machines and operation regulation/safety requirement.

2） Prior to lifting, machines, slings and trailing ropes shall be specially inspected.