

EK 31. EKİPMAN GİYDİRME UYGULAMA PLANI (EQUIPMENT DRESS UP METHOD STATEMENT) ÖRNEĞİ

EQUIPMENT DRESS UP METHOD STATEMENT

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1. INTENT and SCOPE

Conventional erection method of towers and columns is, installation of the equipment is done first and then; steel structure elements, platform, ladders, erection and hydrotest of piping, electrical / instrumentation systems, and insulation works are done using temporary scaffolding and/or cranes / man baskets.

This method is quite risky from safety aspect and also time consuming and requires much manpower. Due to high scaffolding and manpower costs, it is also costly. Therefore, at this method, there is time, safety and money problem.

But nowadays, due to very high capacity of cranes, the method is totally changed. Now, the tall equipment are dressed on the ground before lifting for erection to its place.

Dressing is, installation of equipment's internals, steel structure elements, platform, ladders, piping, electrical / instrumentation systems, and insulation works on the ground level, before lifting.

Working on the ground, make these activities easier, safer and quicker. Also, the quality control teams perform their inspections in a safe manner.

This Method Statement presents a basic concept of dress up method covering all stages from design to field erection of towers and columns taller than 25 meters, in principle.

The advantages are:

- 1) Efficient use of high capacity crane for erection work,
- 2) Decrease in spent man hours for scaffolding work,
- 3) Decrease the cost of scaffolding work,
- 4) Decrease in dangerous operations (high-elevation work, simultaneous high and low elevation works),
- 5) Drastically reduces the construction work period,
- 6) Facilitate the quality control works,
- 7) Reducing construction cost in general.

The disadvantages are:

- 1) Detailed special study and heavy lifting work plan to be done in advance,
- 2) Special sufficient enough, proper dress up area is needed,

- 3) Higher capacity crane is required,
- 4) Transportation from dress up area to erection place needs a special heavy hauling plan.
- 5) At the dress up, site transportation or erection place of the equipment, some other activities might be suspended, until the erection is completed.

2. CONDITIONS

To apply the dress-up method, following conditions to be considered:

- There should be an enough space in the plot plan, which permits the temporary installation of the equipment to be dressed up in horizontal position. If possible, the equipment should be dressed near the erection place, to avoid site handling.
- If the dressing area is not near the erection place, after being dressed up, the equipment should be transported with detailed transportation plan.
- If a civil construction work or underground piping work will be performed in the dress up or erection location, the work schedule should be adjusted accordingly and suspended until the erection completion, not to affect the heavy equipment erection plan.
- The cranes for erection (including auxiliary cranes) and for the dress up activities should be arranged well ahead, since the higher capacity cranes are rare and expensive.
- When the equipment is dressed, since its weight and diameter will be considerably increased, attention will be paid to the main and tail cranes for erection of the dressed equipment. They should have the sufficient capacity and boom length, to lift the total weight of dressed equipment and all parts of elements installed by dress up method.
- Not to impact the continuity of the dress up activities, necessary parts, materials and accessories for the dress up activities should be available when required, to meet the dress up schedule. To achieve a smooth dress up activity, some of the materials should be brought to site, earlier than normally expected. Therefore, the purchasing details should be checked and if necessary, some materials to be urgently delivered to site. As minimum, the below materials should be available at site, for dress up:
 - o Scaffolding materials,
 - o Steel structure platforms, ladders, bolts/nuts, etc.,
 - o Pipes, fittings, valves, gaskets, bolts/nuts,
 - o Pipe support materials, etc.,
 - o Instrumentation (instruments directly installed on towers/vessels, conduit pipes, air pipes, etc.),
 - o Electrical (conduit pipes, lighting fixtures, lightning rods, etc.),
 - o Insulation materials, jacketing materials, auxiliary materials, etc.,
 - o Internals (trays, etc.) ,
 - o Painting materials (primer paint and finishing paint), auxiliary materials, etc.

3. DESIGN AND PLANNING

3.1 Lifting Lug

The design of the lifting lugs of towers/columns to be dressed up should be as per specific job specification.

- 1) The design load for lifting lugs should be based on the total weight of equipment after dress up.
- 2) The lifting lugs of tower/vessels having the insulations should be designed to allow the lifting jig to be installed after insulation work. (See **Fig.1**)

In case this affects the design of the pressure tight portion of equipment, it is necessary to plan to insulate the lifting lug area after erection of towers/vessels. (See Part A of **Fig. 1**)

- 3) The orientation of lifting lugs should be done after considering the weight balance of platforms, ladders and pipes.

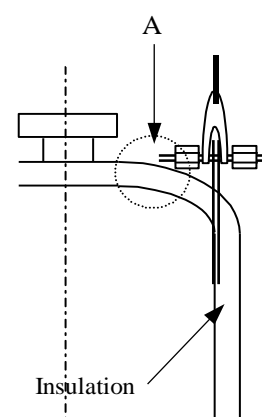


Fig.1

3.2 Tower Clip

Tower clips should be designed as per Fig. 2.

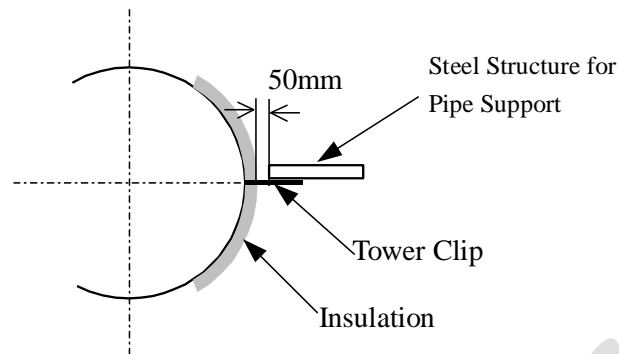


Fig. 2

3.3 Designing of Top Platform

In principle, top platform of towers/columns should be designed lower than the lifting lug. But if the top platform causes obstruction during lifting, not to obstruct the lifting wire it should be removed.

3.4 Skid Positioning

The skids, which are used for transportation, should be utilized for temporary installation required for dress up. The skids arrangement for temporary installation should be in principle at two points or at more points, if the deflection of equipment is more due to staying at horizontal position. Based on dressing study, unnecessary skids maybe removed or new skids to be inserted. The sample of temporary skids arrangement is shown in Fig. 3. The following are the steps for skids arrangement and the points to be paid attention.

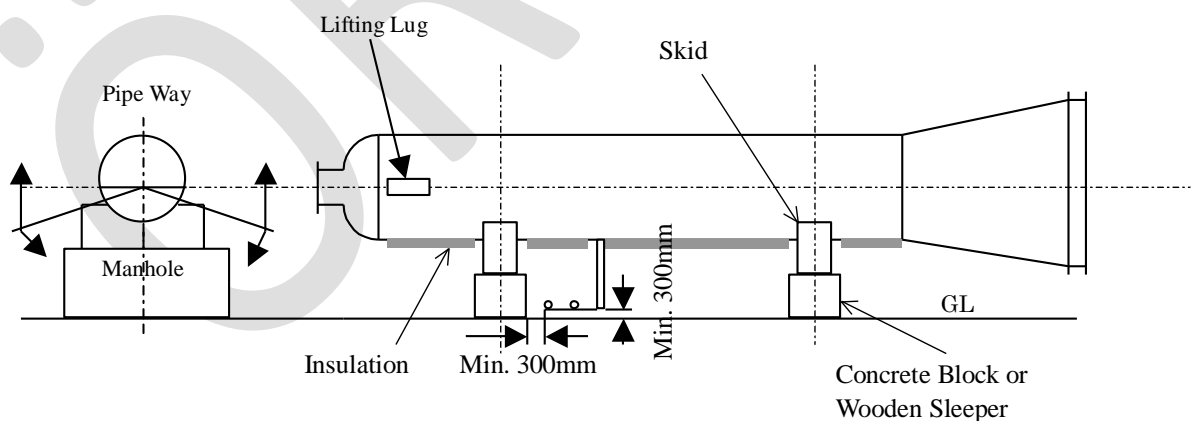


Fig. 3

- (1) Lifting lugs should be located in a horizontal position.
- (2) The skid positions should be planned away from the platforms as far as possible.
- (3) The skid positions should be planned considering the dress up works, and this should be informed to the manufacturer for the shipping arrangement.
- (4) As far as possible, the skid positions should be planned to avoid the interference with the permanent ladder and rising pipe installation.
- (5) The transport skids should be designed to have the sufficient strength, supporting the total weight after dress up.

3.5 Installation of Internals

As far as possible, the internals should be installed in horizontal position of towers/columns. The temporary scaffolding arrangement around the equipment for dress up works should be well planned not to cause any problem to dressing works.

3.6 Design of Piping Support Structures

The piping support structure should be designed to have the sufficient strength to support the pipes in a horizontal position of equipment, considering the water weight coming for the hydrotest of piping.

3.7 Piping for Towers/Columns

For the equipment to be dressed up, the nozzle orientations should be determined immediately after the Plot Plan is fixed and the detail design for platforms, ladders, piping and pipe supports should be done.

- 1) Temporary skids and concrete blocks position should be located in such a way that any piping installation activities will not be obstructed.

The following points should be considered, to determine the orientation in temporary installed position.

- (a) The confirmation of the piping routes and the manhole location,
- (b) The confirmation of platform location,
- (c) The determination of the skid locations,
- (d) The confirmation of lifting lug.

- 2) Piping Test Plan

The hydrostatic test or pneumatic test for the piping to be installed on the dress up towers/vessels should be completed on the ground before installation.

The tie-in point after the erection of equipment should be agreed with the owner, whether the RT 100% shooting or re-test.

- 3) Piping size to be dressed

The piping size to be dressed up should be determined. It is not necessary to apply the dress up method on small bore piping, if it is possible to install them from platform, after the erection of equipment.

3.8 Insulation for skid and skirt area

- 1) Insulation work for the equipment skirt area should be performed after the erection of equipment.

- 2) Insulation work for the equipment skirt area should be performed after the erection of equipment if possible from the platform.

- 3) If above is not possible, the either **(a)** or **(b)** below should be planned to perform.

- (a) Perform the insulation work while the equipment is kept lifted in horizontal condition with two cranes. The insulation materials and cover plates should be prefabricated and be installed in a short time.

- (b) After erection of equipment, perform the insulation work by using partial scaffolding or man-basket.

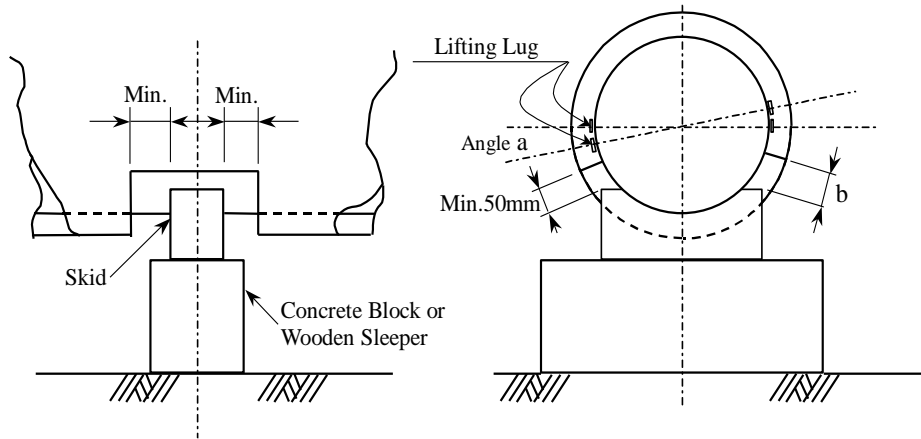


Fig. 6

3.9 Lifting jig, towers/columns overhead piping and support

Fig. 5 shows the movement of the hook and eye-spliced wire from the time of temporary installation till lifting positions from 1 to 4. Any dressed up parts, i.e. piping, pipe supports and platforms, should not be inside this movement area. In case some obstructions are unavoidable because of design conditions (orientation, etc.), they should be designed as removable.

- 1) If the overhead piping obstruct the lifting hook, design the firewater spray pipe at the top, dividable in to two pieces in circumferential direction with flange connection.
- 2) If the equipment is insulated, the clip to fix the firewater spray pipe supports should have the enough length to connect them outside the insulation cover plate.
- 3) If the equipment is insulated, the ladder clips should have the enough length to connect the ladder, outside the insulation cover plate.

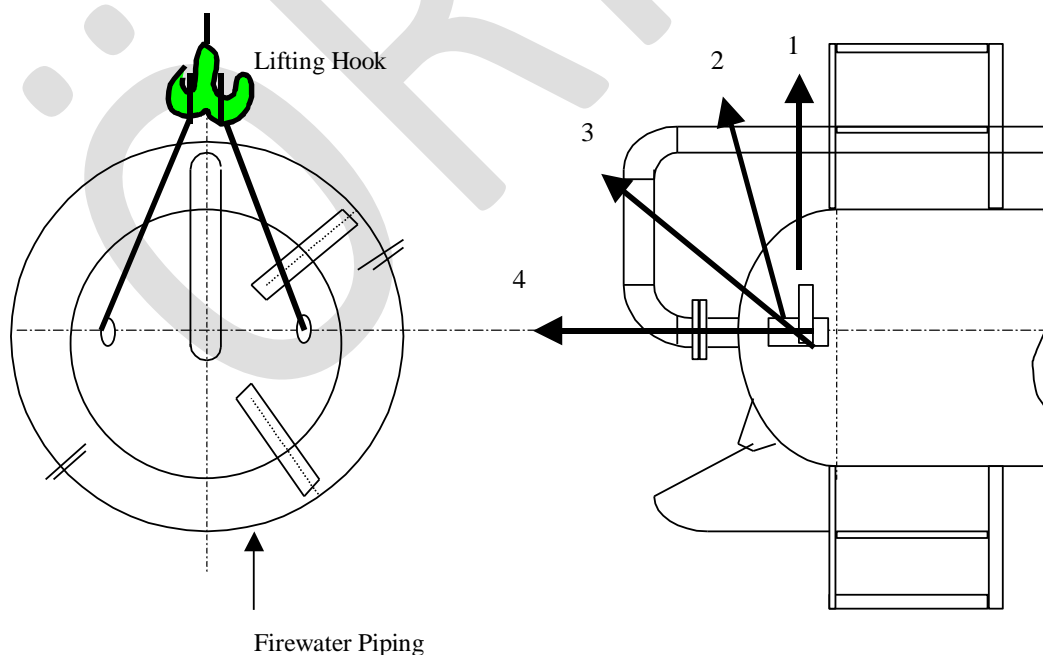


Fig. 5

3.10 Tailing lug

- 1) In principle, the tall equipment are lifted by 2 cranes and the tailing crane holds the

equipment from tailing lug.

The provision of the tailing lug to lift by dual crane should be requested on the design stage for equipment to be dressed up.

- 2) In case the lifting wire may damage skirt or platforms during the lifting, the lifting jig should be provided. (See **Fig. 7**)
 - (a) It should be well studied to select whether the lifting jig should be welded on the bottom plate or fixed by bolts.
 - (b) The lifting jig should be designed and manufactured by vendor. To avoid the missing of lifting jig and to minimize the site activities, the lifting jig should be fixed on equipment at the factory and delivered with the equipment.
 - (c) In case the lifting jig cannot be used due to the erection weight (total weight after dress up), the lifting method should be re-studied well, to solve the technical problems.

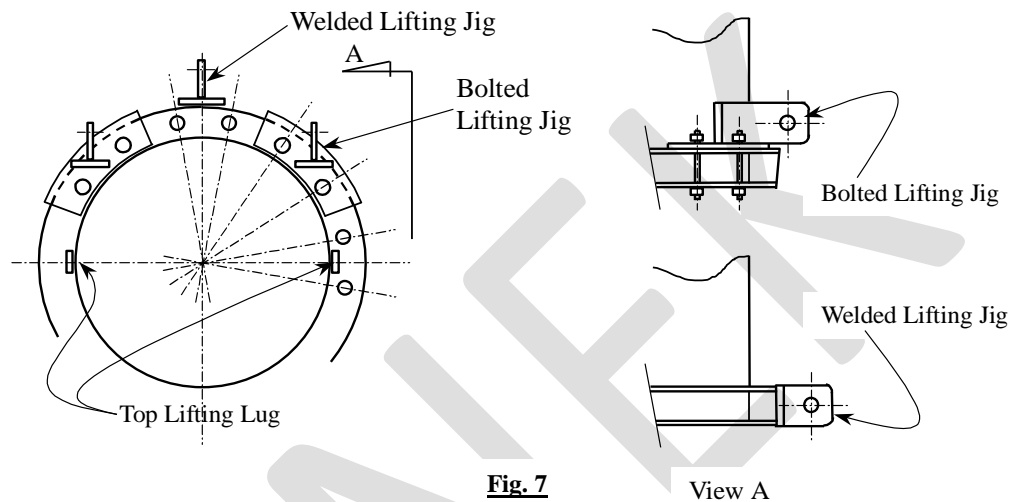


Fig. 7

3.11 Marking location for alignment and insulation

(Marking location of center line for the alignment after erection should be three on the centerline in the longitudinal direction and two at right angles in the circumferential direction. (See **Fig. 8**)

In case the towers/columns have different diameters, markings should be two on the centerline in the longitudinal of each diameter and two at right angle in the circumferential direction. (See **Fig. 9**)

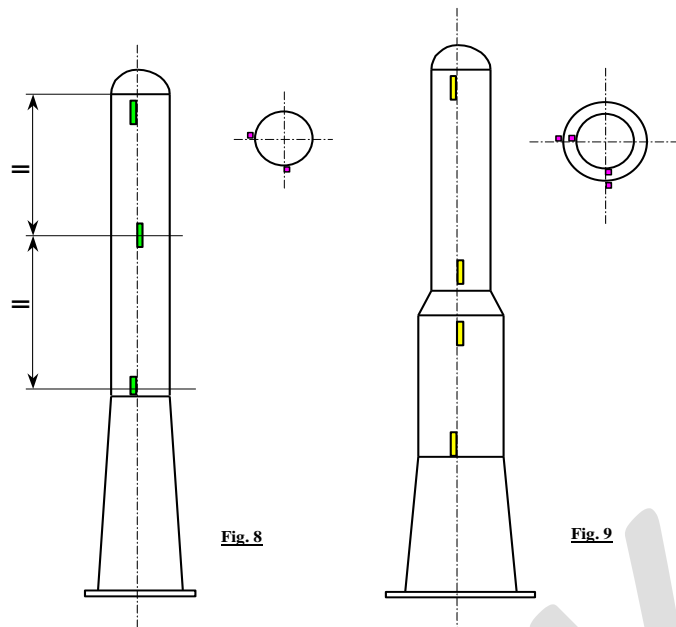


Fig. 8

Fig. 9

In case of insulation

- (a) In case the equipment is insulated, the insulation work where centerlines have been marked should be performed after erection and alignment.
- (b) The insulation work where centerlines have been marked should use the “window” method as shown in **Fig. 10**.

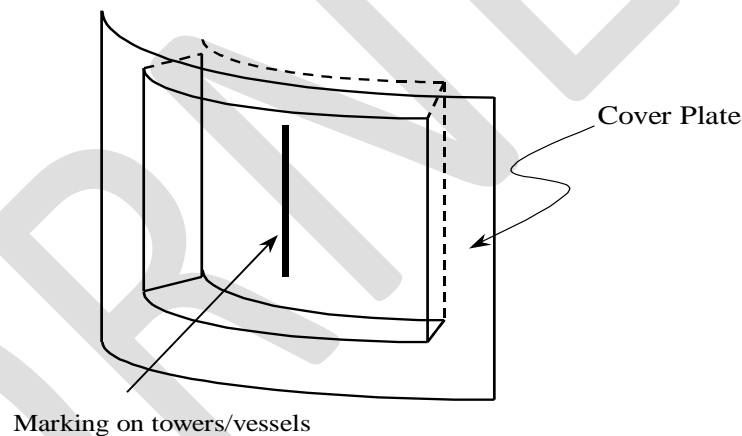


Fig. 10

3.12 Required drawings for dress up

The following drawings should be available at site immediately after the drawing status becomes “AFC – Approved For Construction”.

- (a) Assembly drawings and detail drawings of equipment
- (b) Platform drawings
- (c) Piping drawings around towers/vessels
- (d) Piping spool drawings (Piping isometric drawings)
- (e) Detail drawings of piping support
- (f) Detail drawings of temporary skid
- (g) Detail packing style drawings of towers/columns
- (h) Instrument / Electrical drawings around towers/vessels
(i.e. conduit arrangement, air piping drawings, support detail drawings, etc.)

4. TEMPORARY SCAFFOLDING

4.1 Equipment with insulation

In case towers/columns are insulated, it is preferred to provide the common scaffolding that permits all related disciplines to perform the dress up work using the same scaffolding platform. See below.

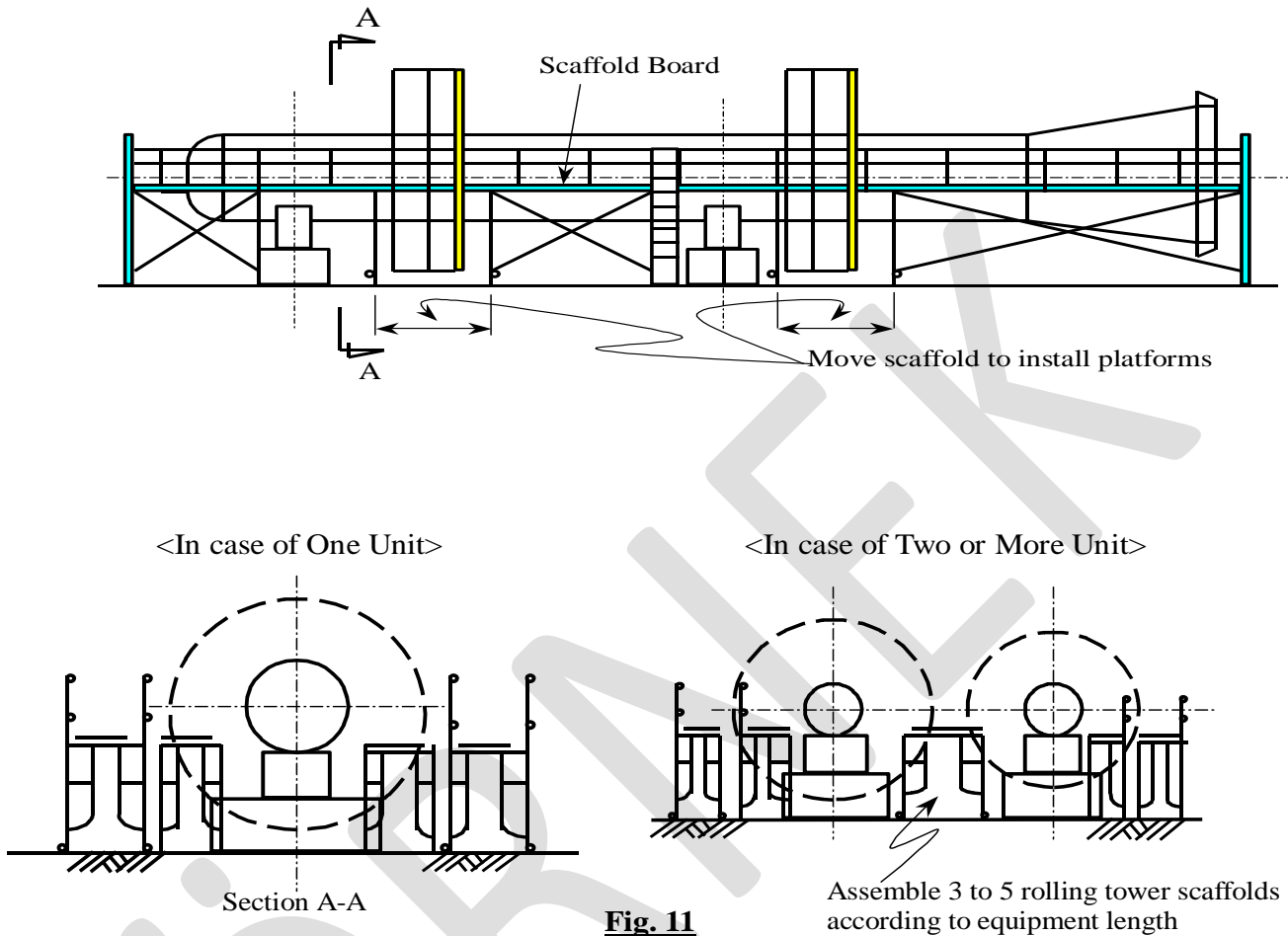


Fig. 11

4.2 Towers/columns without insulation

In case equipment is not insulated, still the above figures are applicable but the design and dimensions will be different.