

ENGINEERING INSTRUCTIONS

GENERAL

BOLTING UP PRACTICE

Purpose
& ScopeResponsi-
bilityTools for
Bolting
UpTools for
DismantlingSelecting
and In-
stalling
GasketsPrepara-
tion of
Flange
FacesInspec-
tion

1. This Instruction covers the prescribed practice for bolting up all * types of flanged joints on Refinery equipment.
2. The Foreman in charge is responsible for the proper direction of * all work and for close adherence to this Instruction. Unusual measures such as the building up of imperfect flanges by welding, re-facing of distorted flanges, and heating and bending of pipe for proper alignment shall be applied only under his direction. He shall report unusual conditions to the Lead Engineer, Designs Section, and shall procure his approval to proceed whenever the corrective measures required are at variance with accepted practice.
3. Proper wrenches are supplied by Central Tool Room. Wrenches longer* than the standard issue shall not be used. Ten pound hand hammers are permissible, but only with hammer wrenches as issued by Central Tool Room. Other tools, such as impact wrenches, longer wrenches, heavy hammers, etc., shall be used in bolting up only when approved by the Foreman in charge.
4. The use of an impact wrench, a hand hammer, sledge, or long wrench * is permissible in all cases of dismantling. Unless specifically approved by the Foreman in charge, use of a length of pipe for additional wrench length shall not be used because of the danger of straining the wrench and the personnel hazards involved.
5. Engineering Instruction R-506, "Selecting and Installing Gaskets" should be used as a reference in connection with this Instruction although much of the material of Instruction R-506 has been included here for convenience.

PREPARATION OF FLANGE FACES

6. Clean the flange faces thoroughly with a wire brush or metal scraper before bolting together. In cases where flanges cannot be separated enough to permit the use of a wire brush, use a thin scraper to remove any foreign matter that might have accumulated on the flanges. On tongue and groove and on ring type flanges, particular care must be exercised to see that the groove is clean. To clean the groove, use a special scraper tool.
7. After cleaning, inspect the flanges for pits and defects in the * gasket faces. Repair minor imperfections by truing up with a file; or in severe cases build up by electric welding and finish with a file, grinding wheel, or portable flange facing tool. Sometimes ORJ flange grooves may be satisfactorily trued by hand lapping with an ORJ gasket.

ENGINEERING INSTRUCTIONS

GENERAL

BOLTING UP PRACTICE

Repairing Distorted Flanges

8. Flanges often show a distortion near the outer circumference caused by excessive stress applied to the bolts. Unless corrected, this will in time prevent the tongue from forming a seal with the gasket, due to the outer edge of the flanges coming in contact before the tongue engages the gasket. Such a condition may be corrected by grinding the flange faces outside the bolt circle, removing enough metal to provide clearance between the flange faces when the flanges are bolted up as outlined in Item 14. In extreme cases the flanges may be refaced, where the thickness of the flange permits. Cases of serious flange distortion shall be referred to the Lead Engineer, Designs Section. *

Chipping Goggles or Safety Spectacles

9. Chipping goggles or safety glasses shall be worn at all times by mechanics who are scraping or wire brushing a flange face or who are refacing a flange either with a file, grinding wheel, or flange facing tool. See Richmond Refinery Instructions 314, Appendix I, pages 5 and 6. *

New Gaskets

10. If available, a new gasket shall always be used.

Reusing Old Gaskets

11. On specific approval by the Foreman in charge, an old gasket may be reused only if: *
- (a) Significant shutdown time can be saved; or
 - (b) New gasket is not readily available; or
 - (c) Old gasket is virtually as good as new.

Installing Gaskets

12. After cleaning the flanges for make-up, as described above, insert the gasket dry. Normally, placement of gasket gives no trouble. Composition gaskets of the proper dimension are centered by the flange bolts. Metal jacket gaskets for tongue and groove or male and female face joints shall be placed with the seam in the bottom of the groove or on the bottom of the female facing. *

BOLTING UP PIPING FLANGES

Lubri- cation

13. To permit easy tightening of bolts and also to provide for dismantling without undue effort, all bolts and nuts must be thoroughly cleaned and lubricated before assembling joints. Use one of the special thread pastes specified in Appendix I for this purpose. Special attention should be given to the nut surface coming in contact with the flange. Lubrication of this surface prevents seizure of the two metals when tightening up.

CHEV BB
0002627

ENGINEERING INSTRUCTIONS

GENERAL

BOLTING UP PRACTICE

Flanges
in
Alignment

14. When flanges are in alignment, both horizontally and vertically, and faces are parallel, install all bolts, with the exception of one or two, and tighten the nuts hand-tight. In one of the holes left open, insert a spud bar and use it as a lever to raise or lower either flange as required to insure proper alignment, and on tongue and groove flanges, the proper entering of the tongue into the groove, and on ring joints, the proper seating of the ring into the groove. When this is accomplished, tighten one bolt sufficiently to keep the tongue and groove engaged, or the ring seated, and then tighten the opposite bolt a like amount. This will result in a parallel facement. Remove the spud bar and install the remaining bolts, tightening them by gradually working around the flange until all bolts are tight with equal tension on each bolt.

Flanges
Out of
Alignment

15. When flanges are out of alignment, either vertically or horizontally, pry the ends of the lines over or up until a spud bar can be inserted in the corresponding hole of each flange, after which proceed as in Item 14. In the event it is not possible to line up lines without excessive strain, corrective measures shall be taken either by heating the pipe or making alterations, as directed by the Foreman in charge. Correct flange misalignment at machinery as required to avoid any significant strain on the machinery.

Flange
Faces
Not
Parallel

16. When flanges are in alignment but the faces are not parallel, if this condition is not too serious and a run of line sufficient for deflection exists on either side of the flanges, proceed as in Item 14, except that the first bolts to be tightened should be on the side of the flange where the greatest opening exists. When flanges are drawn up parallel, all bolts can be tightened to the same approximate degree of tension, and then gradually increased around the bolt circle until all are tight.

Heating
to Align
Pipe

17. If the flanges cannot be drawn parallel without too great a strain on the bolts, the pipe, if carbon steel, may be heated to a temperature sufficient for bending as directed by the Foreman in charge. While at this temperature, bolt the flanges together, as outlined above, and anneal the pipe later to relieve any existing strain. After the pipe has been allowed to cool, unbolt the flanges for inspection, and if strains still exist, repeat the procedure. *

Cold
Pull Up
Flanges
in
Alignment

18. Where chrome nickel pipe and/or fittings are involved, the Lead Engineer, Designs Section, shall be consulted for instructions. *
19. When flanges are in alignment but require a cold pull-up to take care of expansion during operation, bolting up can be accomplished in two ways, i.e., by the use of special bolts or chain blocks.

ENGINEERING INSTRUCTIONS

GENERAL

BOLTING UP PRACTICE

Special
Long
Bolts

20. Special bolts should be of a length great enough to engage the two flanges plus the cold pull. Use at least two bolts to provide equal tension on each side of the flange, and by tightening up these bolts alternately, bring the flanges together. The correct length of bolts shall then be substituted for the special bolts. Tightening of both the special and the regular bolts must be done by one man with the proper length wrench. This will assure that no overstress in the flanges will occur.

Chain
Blocks

21. In using chain blocks, the blocks are lashed to the pipe and the two flanges brought together and bolted up as prescribed in Item 14. All cases of cold pull-up in excess of 4", and such cases where unusual effort is required to bring the flanges together, shall be referred to the Lead Engineer, Designs Sections, for instructions. *

Cold
Pull-up
Flanges
Not
Lined Up

22. When a cold pull-up is necessary and flanges do not face, pull the flanges together as described in Items 20 or 21 and bolt up as described in Item 16.

BOLTING UP COVER PLATES AND VESSEL AND EXCHANGER HEADS

23. The directions given in Item 13 regarding lubrication shall be followed in all cases when bolting up cover plates and vessel or exchanger heads. In most instances facing of cover plates and heads will be normal, and the directions given in Item 14 above can be followed. Where any distortion or misalignment occurs, the matter shall be referred to the Lead Engineer, Designs Section, for instructions. *

TORQUE WRENCHES

Special
Cases

24. In critical services and in other special cases the work requisition may specify the use of a calibrated torque wrench. This type of wrench is carried in the Central Tool Room and may be procured in the usual manner. When used, the required torque will be specified. *

- - - o0o - - -

Attachment

Appendix I

CHEV BB
0002629

ENGINEERING INSTRUCTIONS

APPENDIX I

GENERAL

BOLTING UP PRACTICE

SPECIFICATIONS FOR PASTE FOR USE ON BOLT THREADS

The following bolt thread pastes are available in the Central Tool Room:

1. For temperatures up to 400°F, mixed as follows:

Graphite Grease	35#	(1 - 35# pail)
Flake Graphite	30#	(6 - 5# pkgs.)
White Lead	50#	(2 - 25# pails)
Rod Engine Oil	15 Gals.	

Approximate cost: 20¢ per lb.

2. For temperatures 400°F to 600°F, mixed as follows:

Molybdenum Disulphide Powder	1 part by vol.
Chevron Filter Coat Oil	1 part by vol.

Approximate cost: \$1.55 per lb.

The following bolt thread pastes are carried in stock by the Storehouse:

3. General Service

Led-Plate (anti-seize compound) #250
(Contains metallic lead) Stock #54-4490
Approximate cost: 89¢ per lb.

4. For Monel Bolts Where Lead is Detrimental

Jet-Lube (copper anti-seize compound, lead-free, for temperatures up to 1200°F) SS-30
Stock #54-1520
Approximate cost: \$1.82 per lb.

CHEV BB
0002630