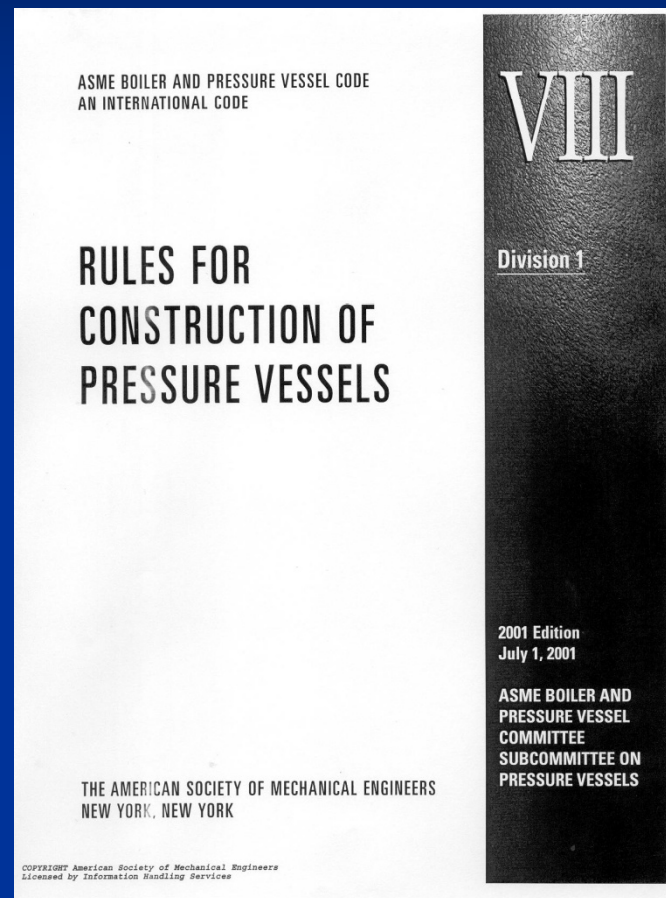
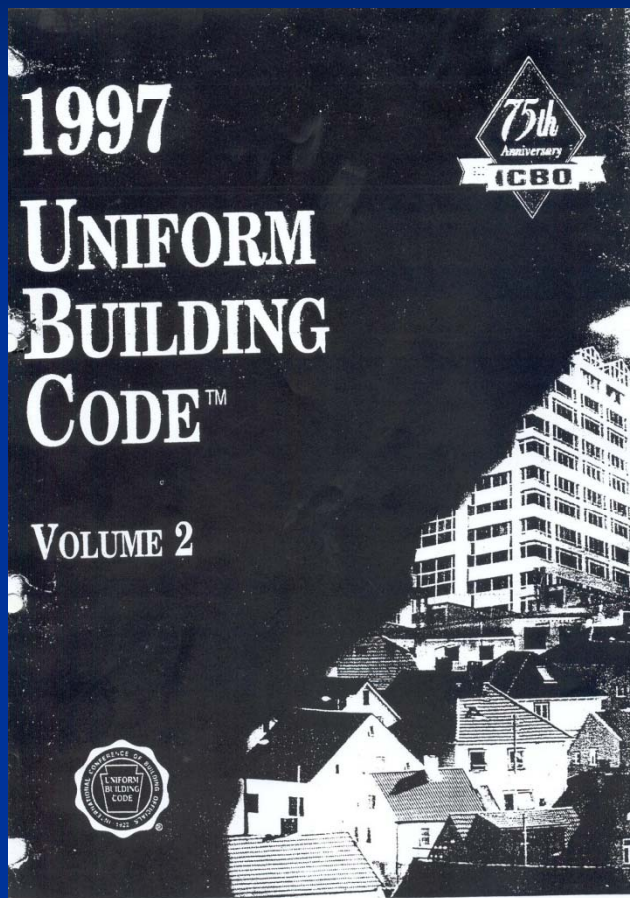
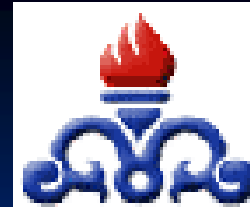


GENERAL INFORMATION ABOUT RETROFITTING OF SPHERICAL VESSEL

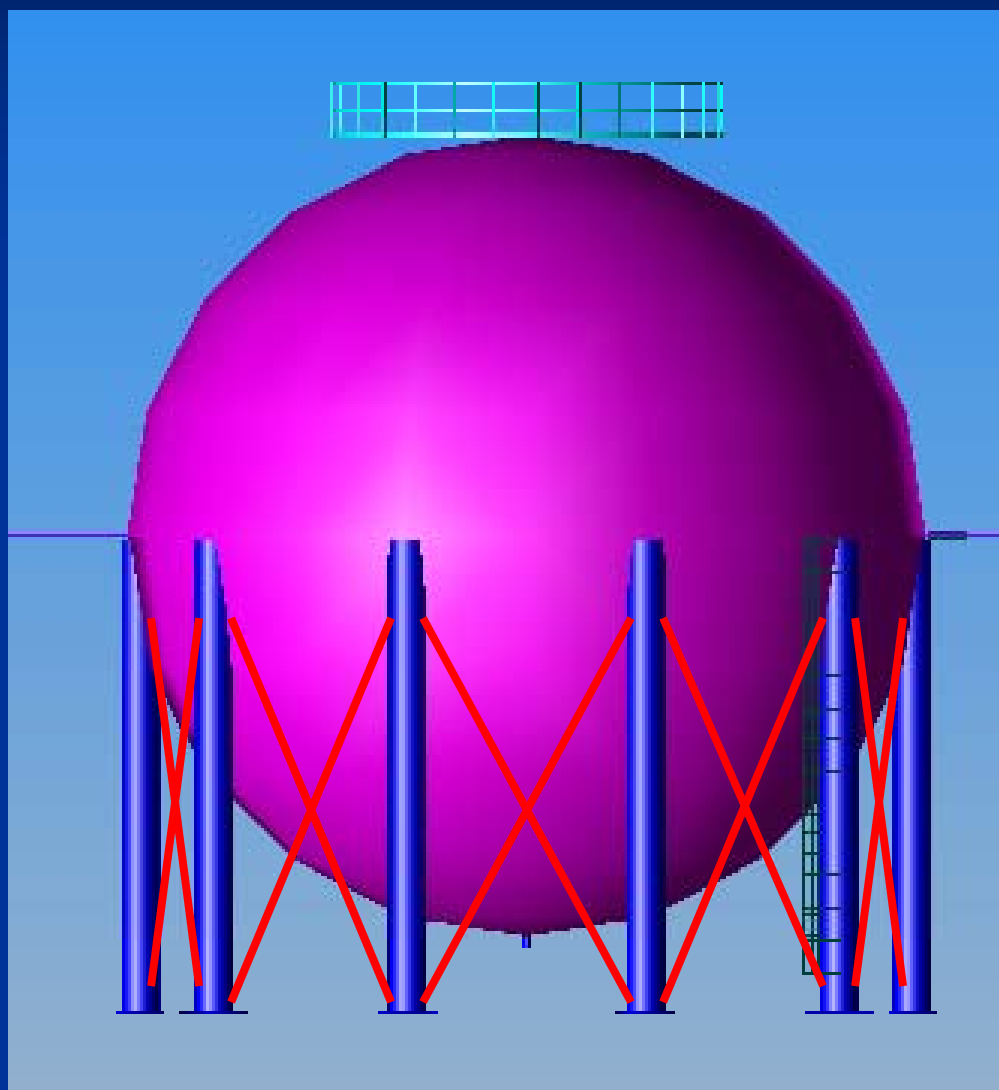
CONTENTS :

- 1- DESIGN CODE AND STANDARDS FOR SPHERICAL VESSEL.
- 2- DIFFERENT TYPE OF SPHERICAL VESSEL.
- 3- SAMPLE DATA SHEETS OF SPHERICAL VESSEL.
- 4- DESIGN FLOWCHART OF SPHERICAL VESSEL.
- 5- DIFFERENT TYPE OF RETROFITTING OF SPHERICAL VESSEL.

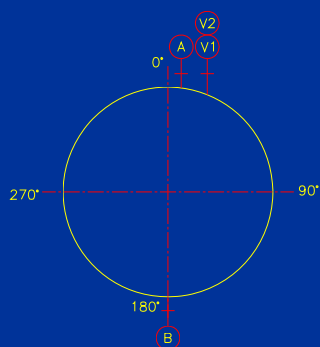
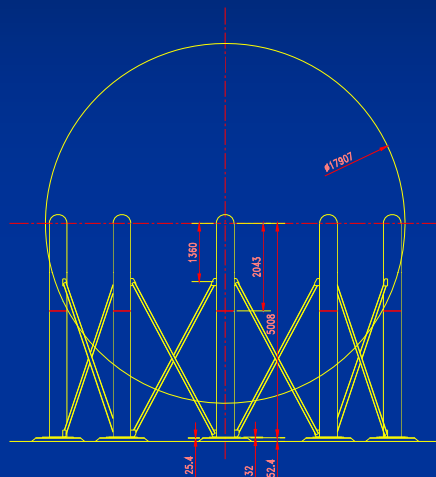
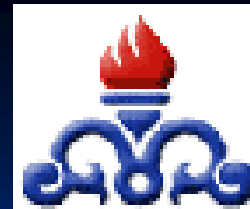
1. DESIGN CODE AND STANDARD FOR SPHERICAL VESSEL



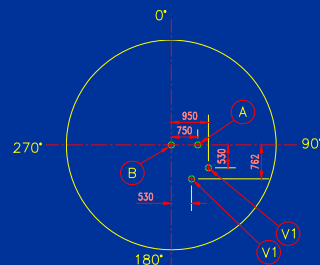
2- DIFFERENT TYPE OF SPHERICAL VESSEL



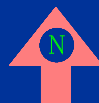
3- SAMPLE DATA SHEET OF SPHERICAL VESSEL



ELEVATION



PLAN

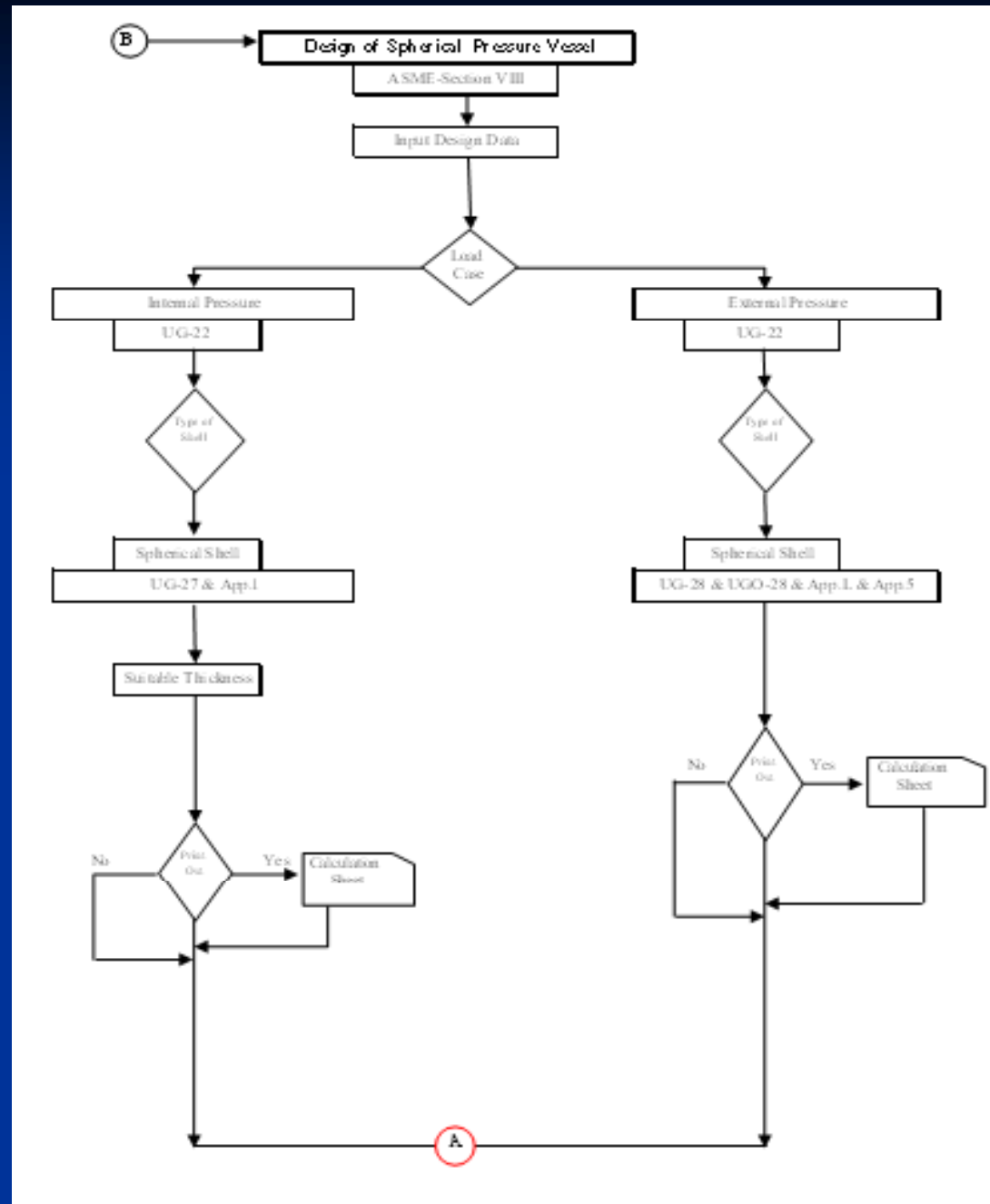


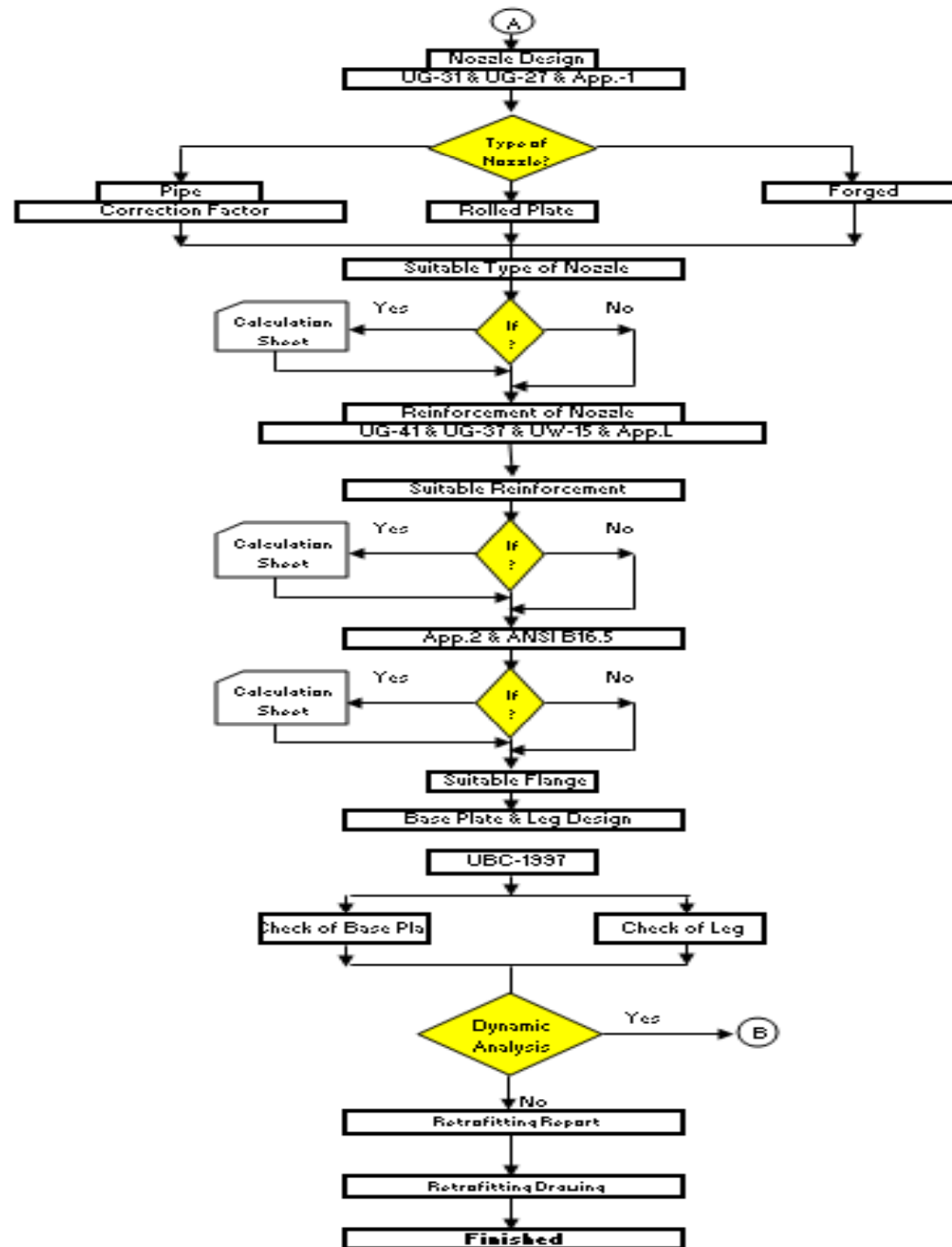
| NOZZLES | | | | | DESIGN DATA | | SHELL | TUBE | JACKET |
|---------|------|--------------|------|--------------|------------------------------------|--------------------|-------|------|--------|
| NOZZLE | SIZE | RATING/TYPE | QTY. | SERVICE | EARTH. QUAKE | ZONE | 4 | - | - |
| A | 3" | 150.W.N.R.F. | 1 | INLET | DESIGN PRESSURE | Kpa g | 471.1 | - | - |
| B | 6" | 150.W.N.R.F. | 1 | OUTLET | DESIGN TEMPERATURE | °C | 232 | - | - |
| V1 | 2" | 150.W.N.R.F. | 1 | VAPOR INLET | FLUID SPECIFIC GRAVITY | Kg/cm ³ | - | - | - |
| V2 | 4" | 150.W.N.R.F. | 1 | VAPOR OUTLET | VESSEL SURFACE | m ² | - | - | - |
| | | | | | HEAT TREATMENT | | No | - | - |
| | | | | | X-RAY TEST | | SPOT | - | - |
| | | | | | JOINT EFFICIENCY | (%) | 85 | - | - |
| | | | | | CORROSION ALLOWANCE | mm | 1.5 | - | - |
| | | | | | GEOMETRIC CAPACITY | m ³ | 5009 | - | - |
| | | | | | INSPECTION INSTITUTE | | - | - | - |
| | | | | | DESIGN CODE : ASME VIII DIV.1-2001 | | | | |
| | | | | | EARTH. QUAKE CODE : UBC 1997 | | | | |
| | | | | | WEIGHTS | | | | |
| | | | | | EMPTY |Kg | | | |
| | | | | | WATER FILLED |Kg | | | |
| | | | | | LOADS AT SUPPORT BASE | | | | |
| | | | | | ERECTOR | | | | |
| | | | | | OPERATION | | | | |
| | | | | | HYDR. TEST | | | | |
| | | | | | M Kg.m | - | - | - | - |
| | | | | | T Kg | - | - | - | - |
| | | | | | Q Kg | - | - | - | - |
| | | | | | EARTHQUAKE | | | | |

| 3 | | | | | | | | | |
|------|---------|--------------|-------|--------|-------|-------|--|--|--|
| 2 | | | | | | | | | |
| 1 | | | | | | | | | |
| 0 | 83/5/30 | FIRST ISSUED | E.P. | A.A | P.M. | H.A. | | | |
| REV. | DATE | DESCRIPTION | DRAWN | DESIGN | CHK'D | APP'D | | | |

| | | | | | |
|--|--|--|--|--|--|
| PROJECT NAME: SEISMIC DESIGN & RETROFIT PROCEDURE FOR TEHRAN OIL REFINING COMPANY | | CLIENT:  N.I.O.C. TEHRAN OIL REFINERY COMPANY | | CONTRACTOR:  FAP FANN AZMAYAN POOYANDEH CO. | |
| DOC. TITLE: DATA SHEET FOR SEISMIC ANALYSIS OF V-2004 | | | | LOCATION: SOUTH REFINERY | |
| SCALE: N.T.S. | | UNIT NAME : | | TANKAGE AREA | |
| DRAWING NO. EQ-S-M-D-V2004-01-00 | | SHEET NO. 1 OF 1 | | REV. 0 | |

4- DESIGN FLOWCHART OF SPHERICAL VESSEL



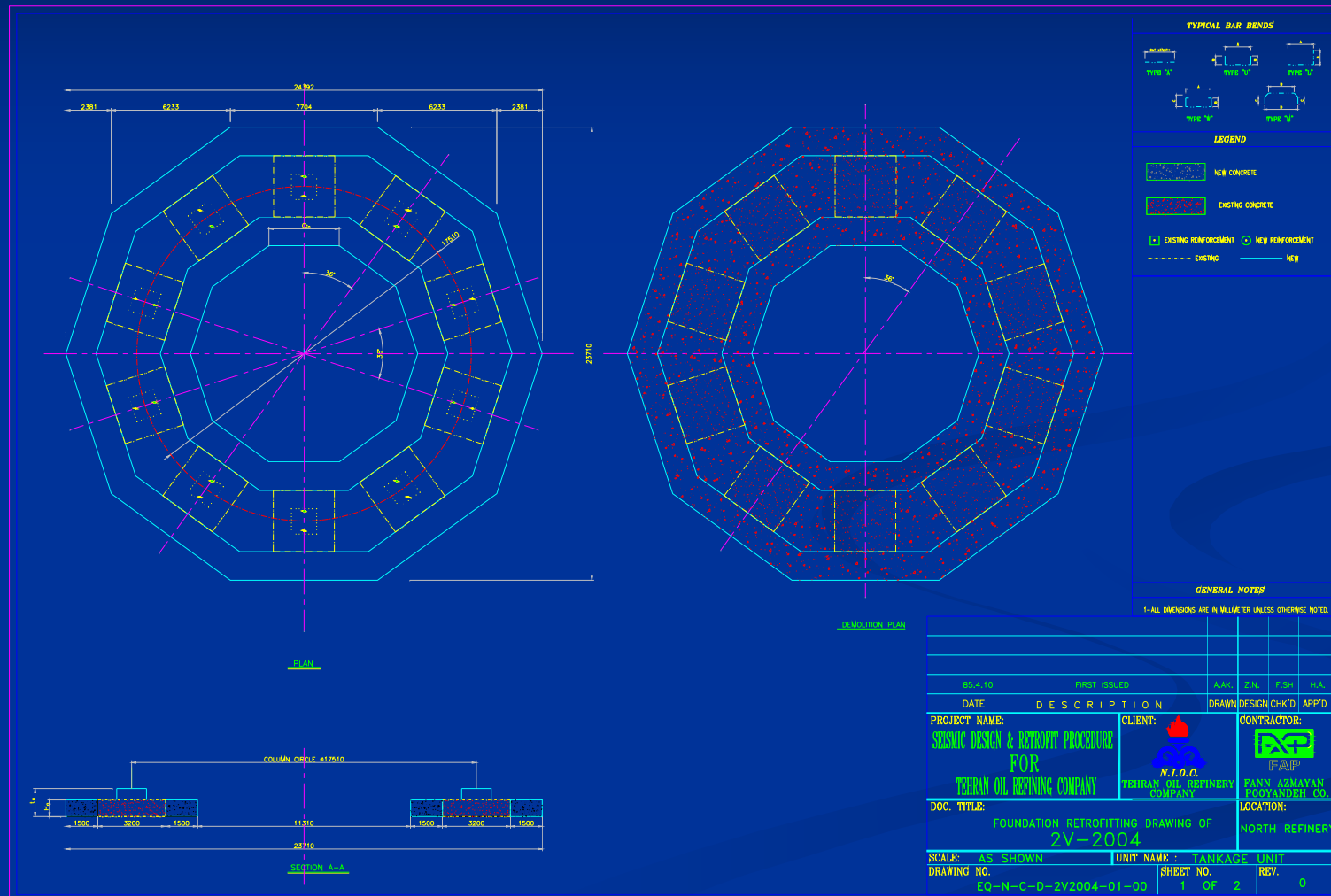


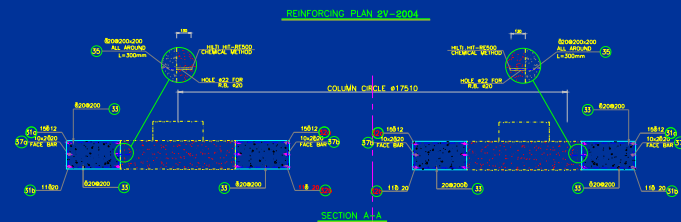
5- DIFFERENT TYPE OF RETROFITTING OF SPHERICAL VESSEL

TYPICAL FAILURE IN SPHERICAL PRESSURE VESSELS :

- 1- BASE PLATE FAILURE IN SPHERICAL PRESSURE VESSELS.
- 2- COLUMN FAILURE IN SPHERICAL PRESSURE VESSELS.
- 3- ANCHOR BOLTS FAILURE IN SPHERICAL PRESSURE VESSELS.

Foundation Retrofitting Drawing







TYPICAL REBAR BENDS

The diagram illustrates six common rebar bending configurations, each with associated dimension labels:

- TYPE A:** A straight rebar with length dimension L .
- TYPE U:** A U-bend with length dimension L , width dimension W , and hook dimensions H and H' .
- TYPE J:** A hook bend with length dimension L , width dimension W , and hook dimensions H and H' .
- TYPE L:** A hook bend with length dimension L , width dimension W , and hook dimensions H and H' .
- TYPE V:** A hook bend with length dimension L , width dimension W , and hook dimensions H and H' .
- TYPE W:** A hook bend with length dimension L , width dimension W , and hook dimensions H and H' .

| | | ROUND BAR | | | | | | | | | |
|-------------|------|------------|-----------|--------------------------|--------|--------|--------|-------------|-------------------|--------------------|--------|
| VESSEL NAME | TYPE | TOTAL LNO. | DIA. (mm) | CUT H | | | | | Total Weight (Kg) | Total Weight (Lbs) | |
| | | | | A (mm) | B (mm) | C (mm) | D (mm) | LENGTH (mm) | | | |
| 31a | V | 150 | 12 | 0 | 7518 | 420 | 0 | 0 | 8358 | 11131 | 1042.1 |
| 31b | V | 110 | 20 | 0 | 6453 | 420 | 0 | 0 | 7293 | 9712 | |
| 32a | V | 110 | 20 | 0 | 7518 | 420 | 0 | 0 | 8358 | 22474 | 2122.9 |
| 32b | V | 150 | 12 | 0 | 6453 | 420 | 0 | 0 | 7293 | 19784 | |
| 33a | V | 110 | 20 | 0 | 6453 | 420 | 0 | 0 | 7293 | 9712 | |
| 33b | V | 110 | 20 | 0 | 3854 | 420 | 0 | 0 | 4694 | 625.1 | 680.1 |
| 33c | U | 1000 | 20 | 0 | 4679 | 420 | 0 | 0 | 5515 | 14972 | 2770.6 |
| 33d | U | 3000 | 20 | 0 | 3854 | 420 | 0 | 0 | 4694 | 12434 | 786.1 |
| 34 | U | 1000 | 12 | 0 | 6000 | 0 | 0 | 0 | 1600 | 3945.8 | 3945.8 |
| 35 | U | 1000 | 12 | 0 | 1950 | 0 | 0 | 0 | 6000 | 1598.1 | 1005.5 |
| 36a | U | 220 | 20 | 0 | 6000 | 0 | 0 | 0 | 6000 | 3255.3 | 2048.1 |
| 36b | U | 220 | 20 | 0 | 1500 | 0 | 0 | 0 | 1500 | 84.8 | 50.8 |
| 36c | U | 280 | 20 | 0 | 3180 | 200 | 0 | 0 | 3380 | 2334.0 | 1747.0 |
| 37 | A | 2848 | 20 | 0 | 1480 | 200 | 0 | 0 | 1680 | 1160.1 | |
| 37a | V | 20 | 20 | 0 | 7518 | 420 | 0 | 0 | 8358 | 412.2 | 2107.1 |
| 37c | V | 20 | 20 | 0 | 3854 | 420 | 0 | 0 | 4694 | 231.5 | 231.5 |
| C = 1320 | | | | | | | | | | | |
| D = 1320 | | | | | | | | | | | |
| h = 535 | | | | | | | | | | | |
| | | | | V = 125.8 m ³ | | | | | | | |
| | | | | Kg | | | | | | | |
| 5700 | | | | 1611.3 | | | | | | | |

GENERAL NOTES
1-ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE NOTED.

| | | | | | | | | | |
|---|---------|-----------------------|--------------|--------------|--|---|--------|--|-------|
| 3 | | | | | | | | | |
| 2 | | | | | | | | | |
| 1 | | | | | | | | | |
| 0 | 85.4.10 | | FIRST ISSUED | | | A.A.K. | Z.N. | F.S.H | H.A. |
| REV. | DATE | DESCRIPTION | | | | DRAWN | DESIGN | CHK'D | APPT' |
| PROJECT NAME: | | | | | | CLIENT: | | CONTRACTOR: | |
| SEISMIC DESIGN & RETROFIT PROCEDURE FOR TEHRAN OIL REFINING COMPANY | | | | | |  N.I.O.C. TEHRAN OIL REFINERY COMPANY | |  F.A.P. FANN AZMAYAN FARSHAD CO. | |
| DOC. TITLE: | | | | | | LOCATION: | | | |
| FOUNDATION RETROFITTING DRAWING OF 2V-2004 | | | | | | NORTH REFINERY | | | |
| SCALE: | | AS SHOWN | | UNIT NUMBER: | | TANKAGE UNIT | | | |
| DRAWING NO. | | EO-N-C-D-2V2004-01-00 | | SHEET NO. | | 2 OF 2 | | REV. | |
| | | | | | | | | 0 | |

RESULT :

- 1- DECREASING THE OVERTURNING MOMENT FOR PRESSURE VESSELS BY ADDING BRACING & COLUMN.
- 2- USE EXTRA ANCHOR BOLTS IN NEW LOCATION .
- 3- INCREASING THE THICKNESS OF BASE PLATE BY MULTI LAYERS PLATE AND PLUG WELDS FOR PRESSURE VESSELS.

THE END