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 Detailed review report of member 7803 - 7801

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 Units: Length -(cm) Force -(kN) Stress -(N/mm2)

 Design Code - ISO 19902:2007(E)

 (Ultimate limit state)

 - Resistance Factors

 Tension 1.0500 Compression 1.1800

 Bending 1.0500 Shear 1.0500

 Hoop Buckling 1.2500

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 \*\*\*\*\*\* Member Infomation \*\*\*\*\*\*

 Group DL7

 Section Name CONE53

 Total Length 1.50 (m)

 Location 0.74 (m)

 Segment 2 of 2

 LC Option List

 Critical LC OP08

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 \*\*\*\*\*\* Basic Properties \*\*\*\*\*\*

 Section Type Cone

 Larger Outside Diameter 134.62

 Wall Thickness 3.80

 Smaller Outside Diameter 106.68

 Cylinder Thickness A 2.54

 Cylinder Thickness B 3.80

 Half Apex Angle (Deg.) 10.35

 Elastic Modulus 210.00 1000(N/mm2)

 Shear Modulus 77.00 1000(N/mm2)

 Yield Strength 248.00 (N/mm2)

 Axial Area A 1394.96

 Mom. of Inertia Iy 2.4E+006

 Mom. of Inertia Iz 2.4E+006

 Shear Area Y 1394.96

 Shear Area Z 1394.96

 Tors. Constant J 4.8E+006

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 \*\*\*\*\*\* Member's Properties \*\*\*\*\*\*

 Slenderness Ratio (KL/r)y 29.77

 Slenderness Ratio (KL/r)z 29.77

 Radius of Gyration ry 41.33

 Radius of Gyration rz 41.33

 Eff. Length Factor Ky 2.00

 Eff. Length Factor Kz 2.00

 Overall Buck. Length Ly 6.10 (m)

 Overall Buck. Length Lz 6.10 (m)

 Final (K\*L)y 12.20 (m)

 Final (K\*L)z 12.20 (m)

 - Segmented Member: Overall buckling length is re-calculated

 from apprximate buckling load effectively at this segment.

 Leffy 1.52 (m)

 Leffz 1.52 (m)

 - KL/r of cone calculated by the averaged diameter (half of two ends)

 TUB Ring Spacing INF

 Reduction Factor Cmy 0.85

 Reduction Factor Cmz 0.85

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 \*\*\*\*\*\* End Forces and Moments ((kN), (kN-m)) \*\*\*\*\*\*

 Tor. Moment Mx 45.5124

 Bending Moment My -1530.8928

 Bending Moment Mz 2127.1609

 Axial force fx -11235277.0000

 Shear force fy -908008.1875

 Shear force fz 130213.6016

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 \*\*\*\*\*\* Acting Stresses (N/mm2) \*\*\*\*\*\*

 Axial stress fa -73.0961

 Bending Major fby -30.4393

 Bending Minor fbz 42.2952

 Shear fv 5.8708

 Torsional Shear fvt 0.4427

 Hydro Hoop Stress fh 0.0000

 - NOTE: Equivalent axial and bending stresses within cone (Eq 13.6-1~3).

 Ds = 134.62 at section of consideration.

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 CHECK AS EQUIVALENT TUBULAR SECTION

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 \*\*\*\*\*\* Basic Allowable Stresses (w/o. Rsist Fact.) (N/mm2) \*\*\*\*\*\*

 Axial Tension Ft 248.0001 (Eq 13.2-1)

 Shear Fv 143.1829 (Eq 13.2-16)

 Axial Compression Fc 240.6894 (Eq 13.2-5,6)

 (Lambda) 0.3256 (Eq 13.2-7)

 Local Buckling Fyc 248.0001 (Eq 13.2-8,9)

 Elastic Local Buckling Fxe 3498.8188 (Eq 13.2-10)

 Bending Fb 324.6060 (Eq 13.2-13~15)

 Euler Buckling Y Fey 2338.7856 (Eq 13.3-5)

 Euler Buckling Z Fez 2338.7856 (Eq 13.3-6)

 - NOTE: DE = DMAX/cos(Alpha) = 136.85 at larger end of cone (except Fey,Fez).

 The larger value of KL/r at the average section (in member properties list) is applied

 --- Reported Allowable Stresses (with Resist. Factors)

 Axial 210.1696

 Major Axis Bending 309.1486

 Minor Axis Bending 309.1486

 Shear in Local Y 136.3647

 Shear in Local Z 136.3647

 Euler Buckling 2338.7856

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 \*\*\*\*\*\*\*\* Unity Checks without Hydro Pressure \*\*\*\*\*\*\*\*

 Compression + Bending (Eq 13.3-7) 0.5063

 (Eq 13.3-8) 0.5164

 Euler Buckling 0.0313

 Local Buckling (Eq 13.6-8) 0.5957

 Combined Shear (Eq 13.2-17,19) 0.0463

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 CHECK AT CONE-TUBE JUNCTION

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 --- CONE-TUBE Junction

 CONE Diameter at Junction D 134.62

 CONE Thickness at Junction T 3.80

 TUBE Diameter at Junction DC 134.62

 TUBE Thickness at Junction TC 2.54

 Half Apex Angle (Deg.) Alpha 10.35

 - NOTE: Junction at LARGE end.

 --- Global actions and localized stresses (N/mm2)

 Global Axial (TUBE) fat -106.6014

 Global Bending (TUBE) fbt 76.7261

 Global Axial (CONE) fa -73.0961

 Global Bending (CONE) fb 52.1098

 Local Bending at CONE 1 fbjc1 -16.8215 (Eq 13.6-5)

 CONE 2 fbjc2 -103.2240

 Local Bending at TUBE 1 fbjt1 -37.6500 (Eq 13.6-4)

 TUBE 2 fbjt2 -231.0364

 Hoop stress at CONE 1 fhc1 11.9467 (Eq 13.6-7)

 CONE 2 fhc2 73.3101

 Hoop stress at TUBE 1 fht1 17.8731 (Eq 13.6-6)

 TUBE 2 fht2 109.6766

 Hydro Hoop in CONE fhc\_P 0.0000

 Hydro Hoop in TUBE fht\_p 0.0000

 --- Allowable stresses at junction (N/mm2)

 CONE TUBE

 Fy 248.0039 248.0039

 Fxe 3498.8188 2377.3601 (Eq 13.2-10)

 Fyc 248.0001 248.0001 (Eq 13.2-5~6)

 Fhe 2371.1201 1584.9066 (Eq 13.6-17)

 Fh 248.0001 248.0001 (Eq 13.6-17)

 - NOTE: Diameter, Thickness of cone and tube at junction are applied, respectively.

 DE = 136.85 for cone side.

 --- Junction Yielding and Buckling check (Sec 13.6.3.3~4)

 \*\*\* Capped-end pressure NOT included \*\*\*

 fh,j S\_max 1 S\_max 2 UC\_YLD UC\_BUK | UC

 CONE 1 11.947 -37.808 -4.165 0.1905 0.0000 | 0.1905

 CONE 2 73.310 -228.430 -21.982 1.1541 0.0000 | 1.1541

 TUBE 1 17.873 -67.525 7.775 0.3303 0.0000 | 0.3303

 TUBE 2 109.677 -414.364 47.709 2.0268 0.0000 | 2.0268

 - NOTE: Check the junction of either larger or smaller end of cone.

 Two locations to be analyzed on each side (cone and tubular).

 S\_max 1, 2 are the possible maximum axial tensile and

 compressive stresses on two points at each location. Unit (N/mm2)

 fh,j is the total hoop stress (Eq 13.6-26). Unit (N/mm2)

 UC\_YLD is calculated from (Eq 13.6-13,14) when fh,j is positive.

 UC\_BUK is calculated from (Eq 13.6-18,21,22) when fh,j is negative.

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 \*\*\*\*\*\*\*\* Reported Unity Ratios \*\*\*\*\*\*\*\*

 Critical Unity Ratio 2.0268 (C 13.6.3.3 ) JCT YLD

 Combined Unity Ratio 2.0268

 Axial Component 2.0268

 Bending Major Y-Y 0.0000

 Bending Minor Z-Z 0.0000

 Shear 0.0463

 Torsional Shear 0.0032

 Euler Buckling 0.0313