

Date \_\_\_\_\_ Calc. \_\_\_\_\_ Chkd. \_\_\_\_\_ Appr. \_\_\_\_\_

Software by SANT'AMBROGIO S.I. srl - Milano, Italy - EN Rev. 1.22-REsB/aUs

BOLTED FLAT END WITH NARROW FACE GASKET POS.:3

According to EN 13445-3 Ed. 2002 up to issue 18 (Clause 10)

Design temperature T = 60.00 C

\* MATERIALS:

END (Record Nr 119) SA 516 Gr. 60 PMA REQUIRED

BOLTS (Record Nr 229) SA 320 L7 PMA REQUIRED; <= 63.5 mm

GASKET -1 -Tesneni

\* NOMINAL DESIGN STRESSES End -----Bolts-----

DESIGN f = 140.750 fbolt = 215.500

TEST fi = 210.476 fbolti = 323.250

AT ROOM TEMPERATURE fa = 147.333 fbolta = 215.500

\* GASKET PARAMETERS : m = 2.75 y = 30.0 MPa N = 20.0 mm

Design pressure p' = 0.900 MPa

Static head (design) p'' = 0.000 MPa

Test pressure pt' = 1.510 MPa

Static head (test) pt'' = 0.000 MPa

Calculation pressure (design) p = p' + p'' = 0.900 MPa

Calculation pressure (test) pt = pt' + pt'' = 1.510 MPa

Bolt circle diameter C = 715.00 mm

Mean gasket diameter G = 655.00 mm

Adopted thickness (center) e = 55.00 mm

Adopted thickness (flanged zone) e1 = 44.00 mm

Groove depth g = 3.000 mm

Corrosion allowance c = 3.00 mm

Bolt number and size Nb = 32 M20 x 2,50 (Iso)

Space between two bolts tBmax = 70.19 mm

cF = MAX[SQR(tBmax / (2\*db + 6\*e1 / (m + 0.5))), 1] = 1.000

----- GASKET DIMENSIONS -----

bo = N/2 bo = 10.00 mm

b = 2.52\*sqrt(bo) (bo > 6.3 mm) b = 7.97 mm

Effective gasket diameter Ge = G + N - 2\*b Ge = 659.06 mm

----- BOLT AREA CHECKING -----

Wop = .785\*Ge^2\*p + 2\*pi\*b\*Ge\*m\*p Wop = 388706.68 N

WA = pi\*Ge\*b\*y WA = 494991.82 N

Wtest = .785\*Ge^2\*pt + 2\*pi\*b\*Ge\*m\*pt Wtest = 652163.43 N

ABop = Wop/fbolt ABop = 1803.74 mm2

ABA = WA/fbolta ABA = 2296.95 mm2

ABtest = Wtest/fbolti ABtest = 2017.52 mm2

Bolt area AB = 7833.41 mm2

----- BOLTING-UP CONDITION -----

e0 = sqrt((CF\*3\*(C-Ge)/pi/Ge\*(WA/fa)) + max(c,g)) e0 = 19.50 mm

e1 = e0 - max(c,g) e1 = 16.50 mm

----- DESIGN CONDITION -----

e0 = sqrt(((3\*(3+v)/32\*Ge^2+CF\*3\*(Ge/4+2\*b\*m)\*(C-Ge))\*p/f) + max(c,g)) e0 = 35.91 mm

e1 = sqrt((CF\*3\*(Ge/4+2\*b\*m)\*(C-Ge))\*p/f) e1 = 14.96 mm

----- TEST CONDITION -----

e0i = sqrt(((3\*(3+v)/32\*Ge^2+CF\*3\*(Ge/4+2\*b\*m)\*(C-Ge))\*pt/fi) + g) e0i = 37.86 mm

e1i = sqrt((CF\*3\*(Ge/4+2\*b\*m)\*(C-Ge))\*pt/fi) e1i = 15.85 mm

----- PRESSURES -----

END 1.43\*p' = 1.287 MPa

END : 1.25\*p'\*fa/f = 1.178 MPa

BOLTING : 1.25\*p'\*fbolta/fbolt = 1.125 MPa

MAX TEST PRESSURE - BOLTS = 5.86 MPa

MAX DESIGN PRESSURE - BOLTS = 3.91 MPa

MAX TEST PRESSURE - END = 3.36 MPa

MAX DESIGN PRESSURE - END = 2.25 MPa