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IRISH STANDARD

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ICS 23.020.10
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National Standards
Authority of Ireland
Dublin 9
Ireland

Tel: (01) 807 3800
Tel: (01) 807 3838

WELDED STATIC NON-PRESSURISED THERMOPLASTIC TANKS - PART 4: DESIGN AND CALCULATION OF FLANGED JOINTS

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Welded static non-pressurised thermoplastic tanks - Part 4: Design and calculation of flanged joints

Cuves statiques soudées en matières thermoplastiques sans pression - Partie 4: Conception et calculs des joints à brides

Geschweißte ortsfeste drucklose Behälter (Tanks) aus Thermoplasten - Teil 4: Konstruktion und Berechnung von Flanschverbindungen

This European Standard was approved by CEN on 14 February 2000.

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 266 "Thermoplastic static tanks", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

prEN 12573:1999 "Welded static non-pressurised thermoplastic tanks" consists of:

Part 1: General principles
Part 2: Calculation of vertical cylindrical tanks
Part 3: Design and calculation of single skin rectangular tanks
Part 4: Design and calculation of flanged joints

The normative annex A gives the values for the calculation of loose metal backing rings

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This part of this standard specifies the design and calculation of circular flanged joints, fabricated in the following thermoplastics:

Polyethylene (PE)
Polypropylene (PP)
Poly (vinyl chloride) (PVC)
Poly (vinylidene fluoride) (PVDF)

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 12573-1:1999	Welded static non-pressurised thermoplastic tanks – Part 1: General principles
EN 1778	Characteristic values for welded thermoplastic constructions – Determination of allowable stresses and moduli for design of thermoplastic equipment

3 Symbols and abbreviations

For the purposes of this part of this Standard the following symbols and abbreviations apply:

A_1	is the reduction factor to take account of the effect of specific strength, see EN 1778
A_{2K}	is the reduction factor taking into account the effect of surrounding medium, see EN 1778
a	is the depth of the weld seam, in millimetre
b	is the effective double flange width, in millimetre
b_D	is the gasket width, in millimetre
C,	are welding process constants
c	is the corrosion allowance, in millimetre
d_D	is the gasket mean diameter, in millimetre

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d_K	is the bolt shank diameter, in millimetre
d_L	is the bolt hole diameter, in millimetre
d'_L	is the reduced bolt hole diameter, in millimetre
d_a	is the outside diameter of flange, in millimetre
d_i	is the inside diameter of cylindrical components, in millimetre
d_t	is the pitch circle diameter, in millimetre
d_1	is the inside diameter of loose backing ring, in millimetre
d_2	is the mean contact diameter of a flange or stub flange, in millimetre
d_3	is the d_1 + 2 x flange edge radius, in millimetre, see figure 15
f_1	is the depth of the weld undercut, in millimetre
h_D	is the gasket thickness, in millimetre
h_F	is the required thickness of a flange plate, in millimetre
K	is the creep strength at the design temperature and lifetime, in newton per square millimetre, see EN 1778
K'	is the creep strength at a test condition (temperature and time), in newton per square millimetre
K_D	is the deformation resistance of gasket material, in newton per square millimetre
K_{Fl}	is the allowable yield stress of loose backing ring material (metal), in newton per square millimetre
K_{Schr}	is the allowable yield stress of bolt material, in newton per square millimetre
k_O	is the characteristic value of a gasket in the assembled condition, in millimetre
k_1	is the characteristic value of a gasket in the operating condition, in millimetre
L_a	is the flange neck height, in millimetre
l	is the lever arm of bolt force, in millimetre
n	is the number of bolts
P_{DV}	is the assembly force, in newton
P_{Fl}	is the surface pressure, in newton per square millimetre
P_{SB}	is the bolt force in operating condition, in newton
P'_{SB}	is the bolt force at test pressure, in newton
P_{SO}	is the bolt force in assembled condition prior to application of pressure, in newton
p	is the operating pressure above atmospheric, in bar
p'	is the test pressure, in bar
S	is the safety factor, see part 1
S_M	is the safety factor for metals in operating condition
S'_M	is the safety factor for metals in test and assembled condition
t	is the wall thickness of cylindrical component, in mm
v	is the weakening coefficient
W_1, W_2, W_3	are the moments of resistance of the flange, in cubic millimetre
y_1, y_2	is the lever arm of the forces acting on the O-ring, in millimetre
α	is the angle, in degrees

4 Design requirements

4.1 General

Various types of flanges are characterized by their shapes as shown in figure 1 to 4:

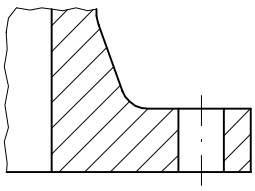

Figure 1: Fusion weld, moulded full face flange

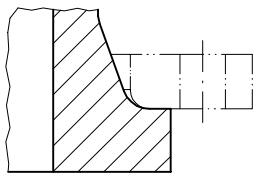

Figure 2: Fusion welded stub flange

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