INTERNATIONAL STANDARD

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AMENDMENT 1
2016-06-01

Safety devices for protection against excessive pressure —

Part 7: **Common data**

AMENDMENT 1

Dispositifs de sécurité pour protection contre les pressions excessives —

Partie 7: Données communes

AMENDEMENT 1

Reference number
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Amendment 1 to ISO 4126-7:2013 was prepared by Technical Committee ISO/TC 185, *Safety devices for protection against excessive pressure*.

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Safety devices for protection against excessive pressure —

Part 7:
Common data

AMENDMENT 1

Page 5

Formula 9

Delete the equation and substitute:

$$3,948 = \frac{3600}{\sqrt{10^5} \times \sqrt{R}}$$

Page 20

Figure 1

Delete the figure and substitute new figure on following page.

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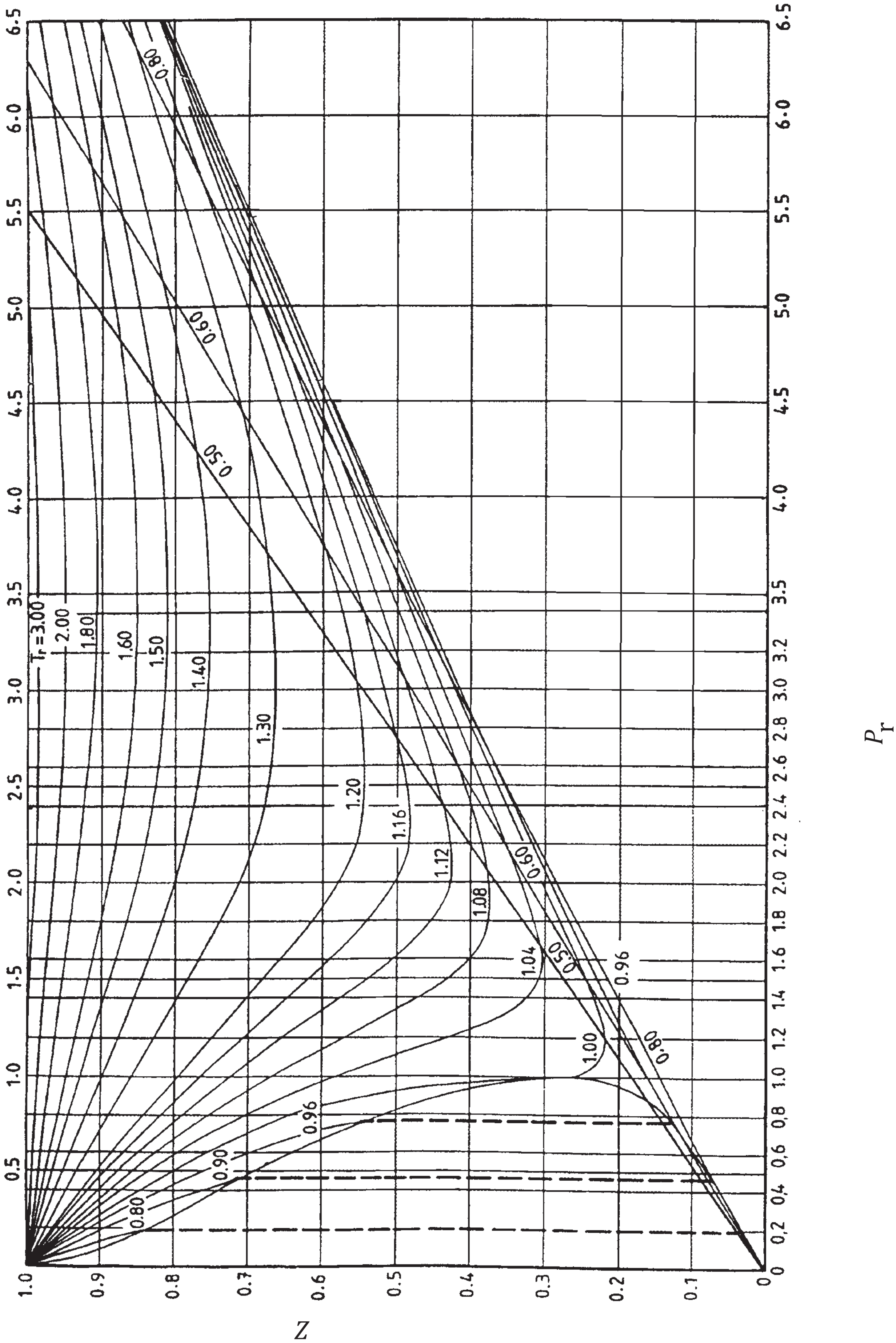

Key

P_r reduced pressure

T_r reduced temperature

Z compressibility factor

Figure 1 — Estimating chart for compressibility factor, *Z*

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Page 28

Clause A.1 Capacity calculations for gaseous media at critical flow (6.3.3.1)

Delete A.1 Example 1 and substitute:

EXAMPLE 1 Calculate the flow area of a safety valve to be used on a vessel holding nitrogen gas with a maximum allowable pressure, PS of 10 bar gauge (1,0 MPa).

Safety valve certified de-rated coefficient of discharge [K_{dr}] at 10 % overpressure	= 0,87
Molar mass of the gas [M]	= 28,02
Isentropic exponent of the gas [k]	= 1,40
Gas relieving temperature	= 20 °C
Required gas flow capacity	= 18 000 kg/h
Set pressure	= 10 bar (1,0 MPa)
Back pressure	atmospheric
T_o	= 20 + 273 = 293 K
p_o	= [10 × 1,1] + 1 = 12 bar (abs)

Since $\frac{p_b}{p_o} \leq \left(\frac{2}{k+1}\right)^{(k/(k-1))}$ the flow is critical.

The required area, $A = \frac{Q_m}{p_o\, CK_{dr} \sqrt{\frac{M}{ZT_o}}}$

$$C = 3{,}948 \sqrt{1{,}4 \mathrm{x} (\frac{2}{1{,}4+1})^{(1{,}4+1)/(1{,}4-1)}} = 2{,}7$$

Values for factor C can also be obtained from Table 3.

Compressibility factor, Z, may be estimated from published data.

The calculation involved is as follows:

Reduced pressure, $P_r = \frac{p_o}{p_c}$

where

p_c is the critical pressure = 33,94 bar (abs.) = 3,394 MPa abs (from a thermodynamics handbook).

Reduced temperature, $T_r = \frac{T_o}{T_c}$

where

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T_c is the critical temperature = 126,05 K (from a thermodynamics handbook);

p_r = 12/33,94 = 0,35;

T_r = 293/126,05 = 2,32;

Z = 1,000 (from Figure 1).

$$A = \frac{18\ 000}{12 \times 2,7 \times 0,87 \times \sqrt{\frac{28,02}{1,00 \times 293}}} = 2\ 065\ \text{mm}^2$$

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