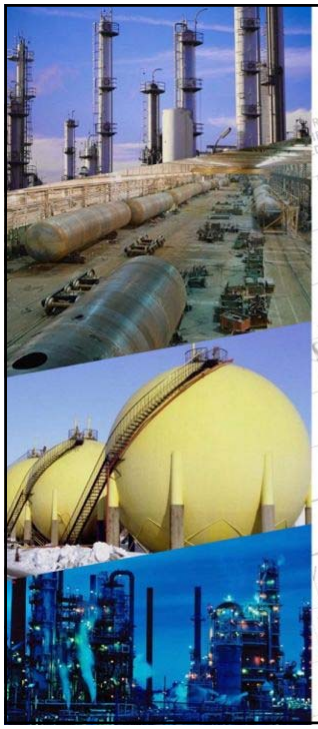


CIS
Consulting Inspection Services

Herzlich Willkommen!

ASME Code
Flansche und Dichtungen

Dr. Dirk Kölbl
Authorized Inspector Supervisor

koelbl@cis-inspector.com

08-13

CIS GmbH

CIS
Consulting Inspection Services

Unsere Spezialität:
ASME Code

ASME
SETTING THE STANDARD

Beratung

CIS GmbH
Consulting Inspection Services

Abnahme

Dienst-
leistungen

CIS - Leistungspektrum

CIS
Consulting Inspection Services

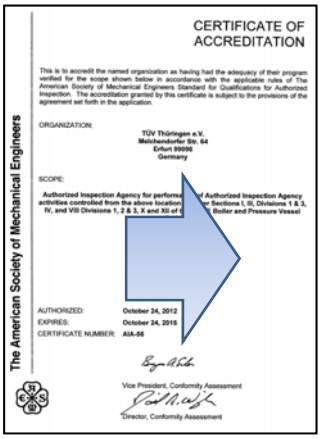
CIS - Unsere Kerngebiete - wir beraten und unterstützen bei:

- ASME Zertifizierungen
- ASME Inspektionen
- der Einführung eines ASME Qualitätswesens
- der ASME konformen Qualifizierung von Schweißern und Schweißverfahren
- der ASME konformen Qualifizierung von ZfP-Personal und -Verfahren
- der Erstellung von Berechnungen gemäß ASME Code und anderen internationalen Regelwerken
- der wirtschaftlichen Anwendung des ASME Codes
- Erlangung von State Specials (Sondergenehmigungen bei Behörden)
- Anfragen an ASME zum Anpassen/Ändern des Regelwerks
- Canadian Registration
- Schulungen (In-House Seminare und öffentliche Seminare)

Was hat CIS mit ASME zu tun?

CIS
Consulting Inspection Services

ASME
SETTING THE STANDARD


The American Society of Mechanical Engineers

CERTIFICATE OF ACCREDITATION

This is to accredit the named organization as having had the adequacy of their program verified for the scope shown below in accordance with the applicable rules of The American Society of Mechanical Engineers Standard for Qualifications for Authorized Inspection. The accreditation granted by this certificate is subject to the provisions of the agreement set forth in the application.

ORGANIZATION:
TÜV Thüringen e.V.
Melchendorfer Str. 64
Erfurt 99096
Germany

SCOPE:
Authorized Inspection Agency for performa[illegible] of Authorized Inspection Agency activities controlled from the above location[illegible] Sections I, III, Divisions 1 & 3, IV, and VIII Divisions 1, 2 & 3, X and XII of t[illegible] Boiler and Pressure Vessel

AUTHORIZED: October 24, 2012
EXPIRES: October 24, 2015
CERTIFICATE NUMBER: AIA-66

Vice President, Conformity Assessment
Director, Conformity Assessment

TÜV THÜRINGEN

CIS
Consulting Inspection Services
Vertriebspartner im TÜV Thüringen Qualitätsprogramm

Hierarchie der Regelwerke

CIS Consulting Inspection Services

- **Vorschriften am Aufstellungsort der Anlage**
  (z. B. South Carolina, North Carolina, Alberta, Deutschland)

- **ASME Boiler and Pressure Vessel Construction Codes**

Section I Dampfkessel	**Section III** Nuklearanlagen	**Section IV** Heizkessel	**Section VIII** Druckbehälter	**Section X** faserverstärkte Kunstharzbeh.	**Section XII** Transportbeh.	**ASME B31.1** Power Piping	**ASME B31.3** Process Piping

Reference Codes

ASME B31.1 Power Piping	**Section II** Materials	**Section V** ZfP (zerstörungsfreies Prüfen)	**Section IX** Schweißen

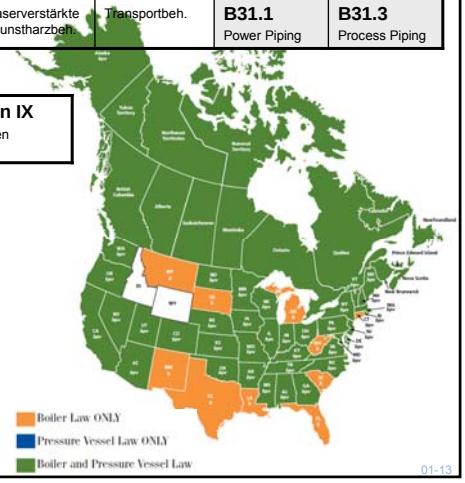
Inservice Codes

Section VI Wartung von Heizkesseln	**Section VII** Wartung von Dampfkesseln	**Section XI** Nuklearanlagen

zugelassene Normen

ASTM	**AWS**	**ASME B16.5 / 16.47**

- **National Board Inspection Code - NBIC**



01-13

Was steht in den Construction Codes?

CIS Consulting Inspection Services

- Manufacturer Certification (Herstellerzulassung)
- Quality System (Qualitätssicherung)
- Material, (Material)
- Design (Auslegung),
- Fabrication (Fertigung, Schweissen)
- Examination (Prüfen)
- Inspection (Abnahme)
- Testing (Druckprobe)
- Certification (Konformitätserklärung)
- Zusammenbau, Montage
- Dokumentation
- Pressure Relief (Überdruckschutz)

ASME U

Nicht geregelt sind:

Wiederkehrende Prüfungen, Reparaturen, Änderungen.

01-13

ASME Code Editions

CIS Consulting Inspection Services

Ausgaben (Editions)

Bisher: alle drei Jahre (..,98, 01, 04, 07, 10)

Seit 2013: alle zwei Jahre (13, 15, 17,..)

Nie die falsche Ausgabe verwenden!

Ergänzungen (Addenda)

Bis 2011: Jährlich, dann eingestellt

Fehlerkorrekturen (Errata)

Werden bei Bedarf online gestellt

01-13

ASME Designators

CIS Consulting Inspection Services

Section I – Dampfkessel

S Dampfkessel
A Montage
E elektrisch beheizte D-Kessel
M Miniaturkessel
PP Dampfleitungen
V * Sicherheitsventile

Section IV – Heizkessel

H Heizkessel (*gußeiserne Heizkessel)
HLW Trinkwasserkessel
HV Sicherheitsventile

Section VIII, Div. 1 – Druckbehälter

U unbefeuerte Druckbehälter
UM * Miniaturdruckbehälter
UV * Sicherheitsventile
UD * Berstscheiben

Section VIII, Div. 2 – Druckbehälter

U2 Alternative Regeln für Druckbehälter

Section VIII, Div. 3 – Druckbehälter

U3 Hochdruckbehälter
UV3 * Sicherheitsventile für Hochdruckbehälter

Section X – Faserverbundbehälter

RP Druckbehälter aus faserverstärktem Kunstharz

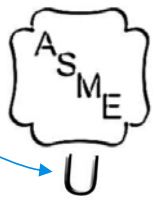
Section XII – Transportbehälter

T transportatble Druckbehälter
TV * Sicherheitsventile
TD * Berstscheiben

National Board Inspection Code

R Reparaturen und Änderungen
VR * Reparaturen von Sicherheitsventilen

* nicht abnahmepflichtig durch einen Authorized Inspector, Auditierung durch ASME erforderlich



01-13

Section VIII - Divisions 1, 2 & 3

CIS Consulting Inspection Services

Section VIII, Division 1

- Berechnungsregeln bis 200 bar, darüber besondere Anforderungen
- einfache Berechnungsregeln
- keine FEM erlaubt, außer unter U-2(g)
- international weit verbreitet

U

Section VIII, Division 2

- Berechnungsregeln bis 700 bar, darüber besondere Anforderungen
- Betreiberspezifikation erforderlich (User´s Design Specification UDS)
- Herstellerbericht erforderlich (Manufacturer´s Design Report MDR)
- jeweils ein RPE (Registered Professional Engineer) muß UDS & MDR zertifizieren
- höhere zulässige Spannungen
- umfangreichere zerstörungsfreie Prüfung (NDE)
- höhere Anforderungen an die Fertigung
- Design by Rule / Design by Analysis gleichrangig

U2

Section VIII, Division 3

- Drücke über 700 bar
- FEM erforderlich
- umfangreichere zerstörungsfreie Prüfung (NDE)
- Materialauswahl sehr beschränkt
- zwei RPEs erforderlich für Zertifizierungen

U3

01-13

VIII-1 Aufbau

CIS Consulting Inspection Services

Foreword
Introduction U-1 to U-4
SUBSECTION A GENERAL REQUIREMENTS
SUBSECTION B METHODS OF FABRICATION
Part UW Pressure Vessels Fabricated by Welding
Part UF Pressure Vessels Fabricated by Forging .
Part UB Brazing .
SUBSECTION C CLASSES OF MATERIALS.
Part UCS Carbon and Low Alloy Steels
Part UNF Nonferrous Materials
Part UHA High Alloy Steel .
Part UCI Cast Iron
Part UCL Corrosion Resistant Integral Cladding
Part UCD Cast Ductile Iron
Part UHT Ferritic Steels with Tensile Properties Enhanced by Heat Treatment.
Part ULW Layered Construction.
Part ULT Low Temperature
Part UHX Heat Exchangers
MANDATORY and NONMANDATORY APPENDICES
Index

01-13

ASME Section VIII Div.1 - CONTENTS

CIS Consulting Inspection Services

MANDATORY APPENDICES

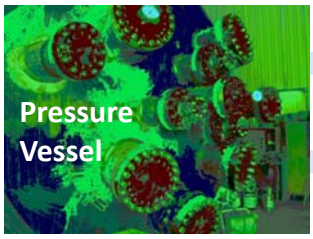
1 Supplementary Design Formulas
2 Rules for Bolted Flange Connections With Ring Type Gaskets
3 Definitions
4 Rounded Indications Charts Acceptance Standard for Radiographically Determined Rounded Indications in Welds
5 Flanged-and-Flued or Flanged-Only Expansion Joints
6 Methods for Magnetic Particle Examination (MT)
7 Examination of Steel Castings
8 Methods for Liquid Penetrant Examination (PT).
9 Jacketed Vessels
10 Quality Control System
11 Capacity Conversions for Safety Valves
12 Ultrasonic Examination of Welds (UT)
13 Vessels of Noncircular Cross Section
14 Integral Flat Heads With a Large, Single, Circular, Centrally Located Opening
16 ~~Submittal of Technical Inquiries to the Boiler and Pressure Vessel Committee~~ E2013
17 Dimpled or Embossed Assemblies
18 Adhesive Attachment of Nameplates

09-2013

ASME Section VIII Div.1 - Scope

CIS Consulting Inspection Services

Paragraph U-1 Scope



For internal or external pressures with:

MAWP: > 100 kPa (15 psi)

Inside Diameter: > 152 mm (6 in)

INCLUDED are:
- Heat Exchangers
- Evaporators
- Steam generators without direct firing
- Fired pressure vessels
- Gas fired jacketed steam kettles with jacket operating pressures < 50 psi (345 kPa)

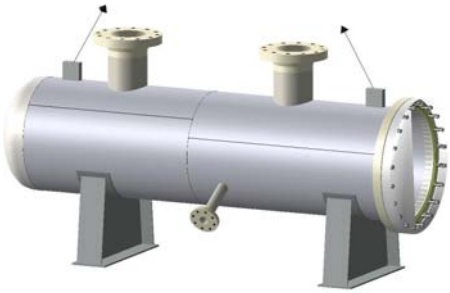
NOT INCLUDED are:
- **Piping and Piping Components,** such as pipe, flanges, bolting, gaskets, valves, expansion joints, fittings, and the pressure containing parts of other components,…
- Rotating or reciprocating mechanical devices, such as pumps, compressors, turbines, generators, engines
- Steam generators with direct firing
- Vessels containing Water
  < 2 Mpa (300 psi) and < 99 °C (210 °F)
- Hot Water Supply Storage tanks
  < 58,6 KW (200000 Btu/hr) and
  < 99 °C (210 °F) and
  < 450 L (120 gal)
- Pressure vessels for human occupancy => PVHO

VIII-1 Geltungsbereich

CIS Consulting Inspection Services

Die geometrischen Grenzen der Section VIII, Division 1 beinhalten:

- Anschweißende für die erste Rundnaht bei geschweißten Rohrleitungsverbindungen
- die erste geschraubte Verbindung
- die erste Dichtfläche bei geflanschten Verbindungen
- die erste Dichtfläche von Fittings
- nicht drucktragende Teile, direkt angeschweißt an drucktragende Teile
- geschweißte und geschraubte Deckel und deren Verschraubung
- die erste Dichtfläche für von Manometern, Instrumentierung, …
- Überducksicherungen



03-13

VIII-1 Flansche

CIS Consulting Inspection Services

Standard Flansche

- **entsprechen einer Norm, die in U-3 gelistet ist**

U-3 STANDARDS REFERENCED BY THIS DIVISION
(a) Throughout this Division references are made to various standards, such as ANSI standards, which cover pressure–temperature rating, dimensional, or procedural standards for pressure vessel parts. These standards, with the year of the acceptable edition, are listed in Table U-3.
(b) Rules for the use of these standards are stated elsewhere in this Division.

zum Beispiel
Pipe Flanges and Flanged Fittings ASME B16.5 2009(2)
Large Diameter Steel Flanges, NPS 26 Through NPS 60 ASME B16.47 2006
Cast Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250 ASME B16.1 2005
Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class ASME B16.24 2006
[…]

Non-Standard Flansche

- **müssen gemäß Appendix 2 berechnet werden, wenn innerhalb des Geltungsbereichs**
- **müssen gemäß U-2(g) berechnet werden, wenn außerhalb des Geltungsbereichs vom Appendix 2**

01-13

VIII-1 Circular Flange Types

CIS Consulting Inspection Services

2-4 CIRCULAR FLANGE TYPES

(a) For purposes of computation, there are three types:

(1) Loose Type Flanges.

Flansch und Rohr bilden KEINE integrale Einheit. Der Flansch wird unabhängig vom Rohr gerechnet

(2) Integral Type Flanges.

Flansch und Rohr bilden eine integrale Einheit, z.B.: voll durchgeschweißt oder aus einem Stück geschmiedet. Die versteifende Wirkung des Zylinders wird mit berücksichtigt.

(3) Optional Type Flanges.

Flansch und Zylinder können als Einheit betrachtet werden, obwohl Sie integral miteinander verbunden sind. Sie müssen als Integral Type Flange gerechnet werden, können der Einfachheit halber auch „loose“ gerechnet werden, wenn folgende Bedingungen nicht überschritten werden:

g_o = 5/8 in. (16 mm)
B / g_o = 300
P = 300 psi (2 MPa)
operating temperature = 700°F (370°C)

01-13

Beispiel ASME B16.5 Standard Flansche

CIS Consulting Inspection Services

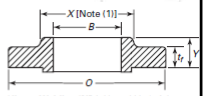
Table 2-1.1 Pressure–Temperature Ratings for Group 1.1 Materials

Nominal Designation	Forgings	Castings	Plates
C–Si	A 105 (1)	A 216 Gr. WCB (1)	A 515 Gr. 70 (1)
C–Mn–Si	A 350 Gr. LF2 (1)		A 516 Gr. 70 (1), (2)
C–Mn–Si–V	A 350 Gr. LF6 Cl. (4)		
3½ Ni	A 350 Gr. LF3		A 537 Cl. 1 (3)

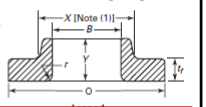
Working Pressure by Classes, bar

Class / Temp., °C	150	300	400	600	900	1500	2500
−29 to 38	19.6	51.1	68.1	102.1	153.2	255.3	425.5
50	19.2	50.1	66.8	100.2	150.4	250.6	417.7
100	17.7	46.6	62.1	93.2	139.8	233.0	388.3
150	15.8	45.1	60.1	90.2	135.2	225.4	375.6
200	13.8	43.8	58.4	87.6	131.4	219.0	365.0
250	12.1	41.9	55.9	83.9	125.8	209.7	349.5
300	10.2	39.8	53.1	79.6	119.5	199.1	331.8
325	9.3	38.7	51.6	77.4	116.1	193.6	322.6
350	8.4	37.6	50.1	75.1	112.7	187.8	313.0
375	7.4	36.4	48.5	72.7	109.1	181.8	303.1
400	6.5	34.7	46.3	69.4	104.2	173.6	289.3
425	5.5	28.8	38.4	57.5	86.3	143.8	239.7
450	4.6	23.0	30.7	46.0	69.0	115.0	191.7
475	3.7	17.4	23.2	34.9	52.3	87.2	145.3
500	2.8	11.8	15.7	23.5	35.3	58.8	97.9
538	1.4	5.9	7.9	11.8	17.7	29.5	49.2

NOTES:
(1) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible but not recommended for prolonged use above 425°C.



Slip-on Welding (NPS ½ to 2½ Only)



14	15
Counter bore Threaded Flange Min. Q	Depth of Socket, D
63.5	17
76.2	19
92.2	21

al Specifications

Applicable ASTM Specifications [Note (1)]

rgings	Castings	Plates
	A 216 Gr. WCB	A 515 Gr. 70 A 516 Gr. 70 A 537 Cl. 1
LF2		
LF6 Cl. 1 LF3		
	A 216 Gr. WCC A 352 Gr. LCC	
LF6 Cl. 2		
	A 352 Gr. LC2 A 352 Gr. LC3	A 203 Gr. B A 203 Gr. E
	A 352 Gr. LCB	A 515 Gr. 65 A 516 Gr. 65 A 203 Gr. A A 203 Gr. D
	A 217 Gr. WC1 A 352 Gr. LC1	
		A 515 Gr. 60 A 516 Gr. 60
LF1 Cl. 1		
F1		A 204 Gr. A A 204 Gr. B

05-2013

VIII-1 Appendix 2 – Loose Flanges

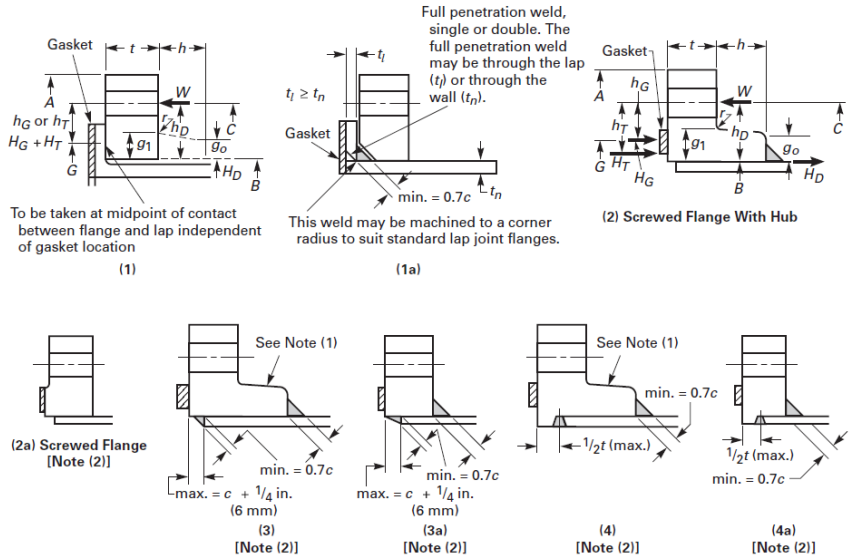
CIS Consulting Inspection Services

(1) Loose Type Flanges. This type covers those designs in which the **flange has no direct connection to the nozzle neck**, vessel, or pipe wall, and designs where the method of attachment is not considered to give the mechanical strength equivalent of integral attachment. See Fig. 2-4 sketches (1), (1a), (2), (2a), (3), (3a), (4), (4a), (4b), and (4c) for typical loose type flanges and the location of the loads and moments. Welds and other details of construction shall satisfy the dimensional requirements given in Fig. 2-4 sketches (1), (1a), (2), (2a), (3), (3a), (4), (4a), (4b), and (4c).

01-13

VIII-1 Appendix 2 – Loose Flanges

CIS Consulting Inspection Services



NOTES (Loose Type Flanges):
(1) For hub tapers 6 deg or less, use $g_o = g_1$.
(2) Loading and dimensions for sketches (2a), (3), (3a), (4), (4a), (4b), and (4c) not shown are the same as for sketch (2).

01-13

VIII-1 Appendix 2 – Integral Flanges

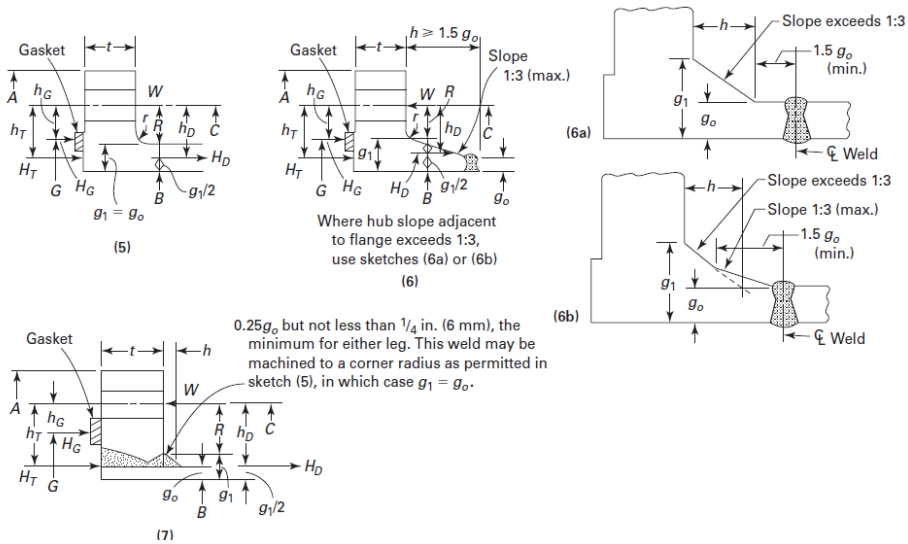
CIS
Consulting Inspection Services

(2) Integral Type Flanges. This type covers designs where the flange is cast or forged integrally with the nozzle neck, vessel or pipe wall, butt welded thereto, or attached by other forms of arc or gas welding of such a nature that the **flange and nozzle neck, vessel or pipe wall is considered to be the equivalent of an integral structure**. In welded construction, the nozzle neck, vessel, or pipe wall is considered to act as a hub. See Fig. 2-4 sketches (5), (6), (6a), (6b), and (7) for typical integral type flanges and the location of the loads and moments. Welds and other details of construction shall satisfy the dimensional requirements given in Fig. 2-4 sketches (5), (6), (6a), (6b), and (7).

01-13

VIII-1 Appendix 2 – Integral Flanges

CIS
Consulting Inspection Services



GENERAL NOTE (Loose and Integral Type Flanges):

(a) Fillet radius r to be at least $0.25g_1$ but not less than 3/16 in. (5 mm).

(b) Facing thicknesses or groove depths greater than 1/16 in. (1.5 mm) shall be in excess of the required minimum flange thickness t; those equal to or less than 1/16 in. (1.5 mm) may be included in the overall flange thickness.

VIII-1 Appendix 2 – Optional Flanges

CIS Consulting Inspection Services

(3) Optional Type Flanges. This type covers designs where the attachment of the flange to the nozzle neck, vessel or pipe wall is such that the **assembly is considered to act as a unit**, which shall be calculated as an integral flange, except that for simplicity the designer may calculate the construction as a loose type flange provided none of the following values is exceeded:

g_o = 5/8 in. (16 mm)

B / g_o = 300

P = 300 psi (2 MPa)

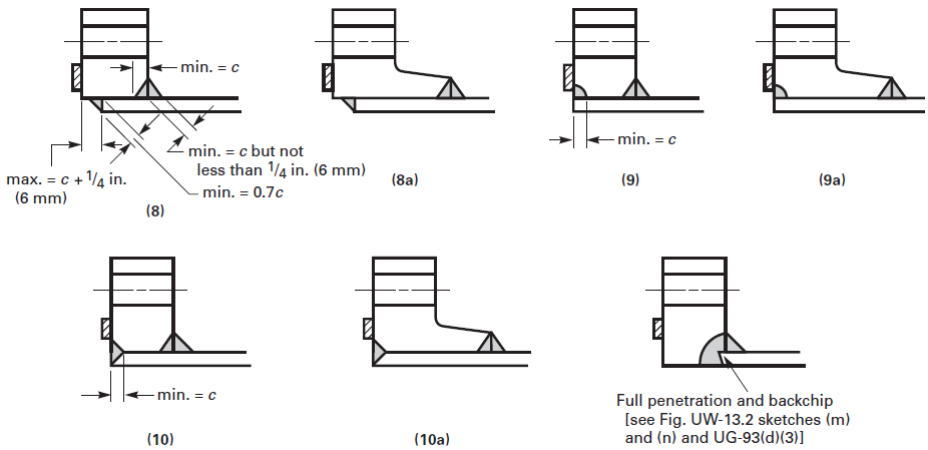
operating temperature = 700°F (370°C)

See Fig. 2-4 sketches (8), (8a), (9), (9a), (10), (10a), and (11) for typical optional type flanges. Welds and other details of construction shall satisfy the dimensional requirements given in Fig. 2-4 sketches (8), (8a), (9), (9a), (10), (10a), and (11).

01-13

VIII-1 Appendix 2 – Optional Flanges

CIS Consulting Inspection Services



GENERAL NOTES (Optional Type Flanges):

(a) Optional type flanges may be calculated as either loose or integral type. See 2-4.

(b) Loadings and dimensions not shown in sketches (8), (8a), (9), (9a), (10), and (10a) are the same as shown in sketch (2) when the flange is calculated as a loose type flange and as shown in sketch (7) when the flange is calculated as an integral type flange.

(c) The groove and fillet welds between the flange back face and the shell given in sketch (8) also apply to sketches (8a), (9), (9a), (10), and (10a).

01-13

VIII-1 Appendix 2: Flanschberechnung

CIS Consulting Inspection Services

Verfahren zur Flanschberechnung

1. Bestimmung des Flanschtyps (Integral- / loose type flange)
2. Auswahl Dichtung
3. Auswahl der Schrauben (Material, Abmessung, Anzahl, Teilkreis)
4. Festlegen der Geometrie
5. Berechnung der Schrauben
6. Ermittlung der Momente
7. Loose Type Flansch ► direkte Berechnung der Flanschblattdicke
8. Integral Type Flansch ► iteratives Verfahren:
   a. Festlegen der Flanschblattdicke
   b. Berechnung der Spannungen
   c. Spannungsbewertung
9. zusätzlich bei Integral und Loose:
   Berechnung der Steifigkeit (Flanschblattneigung) Appendix 2-14

01-13

VIII-1 App. 2 Schrauben

CIS Consulting Inspection Services

2-2 Materials

(e) Bolts, studs, nuts, and washers shall comply with the requirements in this Division. It is recommended that bolts and studs have a nominal diameter of not less than 1⁄2 in. (13 mm). If bolts or studs smaller than 1⁄2 in. (13 mm) are used, ferrous bolting material shall be of alloy steel. Precautions shall be taken to avoid over-stressing small diameter bolts.

2-5 Bolt Loads

(d) […] For vessels in **lethal service** or when specified by the user or his designated agent, the maximum bolt spacing shall not exceed the value calculated in accordance with eq. (3).

$$B_{smax} = 2a + \frac{6t}{m + 0.5}$$

$$B_{smax} = \text{maximum bolt spacing}$$

01-13

VIII-1 App. 2 Dichtungen

CIS Consulting Inspection Services

TABLE 2-5.1
GASKET MATERIALS AND CONTACT FACINGS[1]
Gasket Factors *m* for Operating Conditions and Minimum Design Seating Stress *y*

Gasket Material	Gasket Factor *m*	Min. Design Seating Stress *y*, psi (MPa)	Sketches	Facing Sketch and Column in Table 2-5.2
Self-energizing types (O rings, metallic, elastomer, other gasket types considered as self-sealing)	0	0 (0)	. . .	. . .
Elastomers without fabric or high percent of mineral fiber:				
Below 75A Shore Durometer	0.50	0 (0)		(1a),(1b),(1c),(1d), (4),(5); Column II
75A or higher Shore Durometer	1.00	200 (1.4)		
Mineral fiber with suitable binder for operating conditions:				
1/8 in. (3.2 mm) thick	2.00	1,600 (11)		(1a),(1b),(1c),(1d), (4),(5); Column II
1/16 in. (1.6 mm) thick	2.75	3,700 (26)		
1/32 in. (0.8 mm) thick	3.50	6,500 (45)		
Ring joint:				
Iron or soft steel	5.50	18,000 (124)		(6); Column I
Monel or 4%–6% chrome	6.00	21,800 (150)		
Stainless steels and nickel-base alloys	6.50	26,000 (180)		

m = gasket factor, obtain from Table 2-5.1 [see Note 1, 2-5(c)(1)]
y = gasket or joint-contact-surface unit seating load, [see Note 1, 2-5(c)]

NOTES:
(1) This Table gives a list of many commonly used gasket materials and contact facings with suggested design values of *m* and *y* that have generally proved satisfactory in actual service when using effective gasket seating width *b* given in Table 2-5.2. The design values and other details given in this Table are suggested only and are not mandatory.
(2) The surface of a gasket having a lap should not be against the nubbin.

01-13

VIII-1 App. 2-5 Bolt Loads

CIS Consulting Inspection Services

(c) Required Bolt Loads. The flange bolt loads used in calculating the required cross-sectional area of bolts shall be determined as follows.

(1) The required bolt load for the operating conditions W_{m1} shall be sufficient to resist the hydrostatic end force H exerted by the maximum allowable working pressure on the area bounded by the diameter of gasket reaction, and, in addition, to maintain on the gasket or joint-contact surface a compression load H_p, which experience has shown to be sufficient to assure a tight joint. (This compression load is expressed as a multiple m of the internal pressure. Its value is a function of the gasket material and construction.)

NOTE: Tables 2-5.1 and 2-5.2 give a list of many commonly used gasket materials and contact facings, with suggested values of *m*, *b*, and *y* that have proved satisfactory in actual service. These values are suggested only and are not mandatory.

The required bolt load for the operating conditions W_{m1} is determined in accordance with eq. (1).

$$W_{m1} = H + H_p = 0.785G^2P + (2b \times 3.14GmP) \qquad (1)$$

(2) Before a tight joint can be obtained, it is necessary to seat the gasket or joint-contact surface properly by applying a minimum initial load (under atmospheric temperature conditions without the presence of internal pressure), which is a function of the gasket material and the effective gasket area to be seated. The minimum initial bolt load required for this purpose W_{m2} shall be determined in accordance with eq. (2).

$$W_{m2} = 3.14bGy \qquad (2)$$

The need for providing sufficient bolt load to seat the gasket or joint-contact surfaces in accordance with eq. (2) will prevail on many low-pressure designs and with facings and materials that require a high seating load, and where the bolt load computed by eq. (1)(1) for the operating conditions is insufficient to seat the joint. Accordingly, it is necessary to furnish bolting and to pretighten the bolts to provide a bolt load sufficient to satisfy both of these requirements, each one being individually investigated. When eq. (2) governs, flange proportions will be a function of the bolting instead of internal pressure.

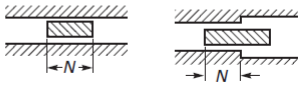
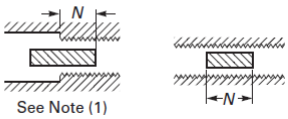
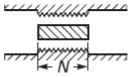
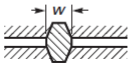
Table 2-4
Recommended Minimum Gasket Contact Widths for Sheet and Composite Gaskets

Flange ID	Gasket Contact Width
24 in. (600 mm) < ID ≤ 36 in. (900 mm)	1 in. (25 mm)
36 in. (900 mm) < ID < 60 in. (1500 mm)	1 1/4 in. (32 mm)
ID ≥ 60 in. (1500 mm)	1 1/2 (38 mm)

VIII-1 App. 2 Effektive Dichtungsbreite

CIS Consulting Inspection Services

TABLE 2-5.2
EFFECTIVE GASKET WIDTH

Facing Sketch (Exaggerated)	Basic Gasket Seating Width b_o	
	Column I	Column II
(1a) 	$\frac{N}{2}$	$\frac{N}{2}$
(1b)  See Note (1)		
(5)  See Note (1)	$\frac{N}{4}$	$\frac{3N}{8}$
(6) 	$\frac{W}{8}$	. . .

01-13

VIII-1 App. 2 Effektive Dichtungsbreite

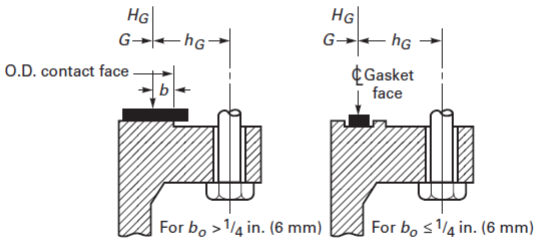
CIS Consulting Inspection Services

TABLE 2-5.2
EFFECTIVE GASKET WIDTH (CONT'D)

Effective Gasket Seating Width, b

$b = b_o$, when $b_o \leq 1/4$ in. (6 mm); $b = C_b\sqrt{b_o}$, when $b_o > 1/4$ in. (6 mm)

Location of Gasket Load Reaction



GENERAL NOTE: The gasket factors listed only apply to flanged joints in which the gasket is contained entirely within the inner edges of the bolt holes.

NOTE:
(1) Where serrations do not exceed $1/64$ in. (0.4 mm) depth and $1/32$ in. (0.8 mm) width spacing, sketches (1b) and (1d) shall be used.

01-13

VIII-1 App. 2 Flange Rigidity

CIS
Consulting Inspection Services

2-14 FLANGE RIGIDITY

(a) Flanges that have been designed based on allowable stress limits alone may not be sufficiently rigid to control leakage. This paragraph provides a method of checking flange rigidity. The rigidity factors provided in Table 2-14 have been proven through extensive user experience for a wide variety of joint design and service conditions. The use of the rigidity index does not guarantee a leakage rate within established limits. The use of the factors must be considered as only part of the system of joint design and assembly requirements to ensure leak tightness. Successful service experience may be used as an alternative to the flange rigidity rules for fluid services that are nonlethal and nonflammable and designed within the temperature range of −20°F (−29°C) to 366°F (186°C) without exceeding design pressures of 150 psi (1 035 kPa).

01-13