



GENERAL SPECIFICATION

LIMITATIONS ON PIPE JOINTS AND COMPONENTS

**ENGINEERING TECHNICAL STANDARDS & PROCEDURES
PT KILANG PERTAMINA INTERNASIONAL
DIREKTORAT PROYEK INFRASTRUKTUR**

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1. INTRODUCTION

This Standard covers additional requirements to ASME B31.1, B31.3, B31.4 and B31.8 piping codes and defines requirements governing the selection of metallic pipe fittings, bends, miters, laps, and branch connections for plant piping and pipelines. Tube fittings and other specialty fittings are outside the scope of this standard.

2. SCOPE

This Standard covers the limitations on various types of piping joints and components used in metallic piping for pressure piping systems.

3. CONFLICTS AND DEVIATIONS

- 3.1 Any conflicts between this standard and other applicable Engineering Technical Standards & Procedures (ETSP), or OWNER standard, codes, and form norms shall be resolved in writing by OWNER.
- 3.2 All direct requests to deviate from this standard (ETSP) in writing to OWNER, who shall follow internal OWNER procedure and forward such requests to OWNER for approval.

4. ABBREVIATIONS

Abbreviations used for this document shall have the following definitions:

MIGAS Minyak dan Gas Bumi (Ministry of ESDM)

1. PENGANTAR

Standar ini mencakup persyaratan tambahan pada kode perpipaan ASME B31.1, B31.3, B31.4 dan B31.8, serta mendefinisikan persyaratan yang mengatur pemilihan *metallic pipe fitting*, *bend*, *miter*, *lap*, dan *branch connection* untuk *piping* dan *pipelines* di kilang. *Tube fitting* dan *fitting* khusus lainnya terdapat di luar cakupan standar ini.

2. LINGKUP

Standar ini mencakup batasan-batasan pada berbagai jenis sambungan perpipaan dan komponennya yang digunakan pada *metallic piping* untuk sistem perpipaan bertekanan.


3. KONFLIK DAN DEVIASI

- 3.1 Apabila terdapat konflik antara standar ini dengan *Engineering Technical Standards & Procedures* (ETSP) lainnya yang diberlakukan, atau konflik dengan standar, kode dan norma-norma dari PEMILIK, maka harus diselesaikan secara tertulis oleh PEMILIK.
- 3.2 Semua permintaan deviasi terhadap standar (ETSP) ini, harus diajukan kepada PEMILIK secara tertulis dengan mengikuti prosedur internal PEMILIK untuk mendapatkan persetujuan.

4. SINGKATAN

Singkatan yang digunakan pada dokumen ini harus memiliki definisi sebagai berikut:

MIGAS Minyak dan Gas Bumi (Kementerian ESDM)

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NPT	Nominal Pipe Thread	NPT	<i>Nominal Pipe Thread</i>
PTFE	Polytetrafluoroethylene	PTFE	<i>Polytetrafluoroethylene</i>
SMYS	Specified Minimum Yield Strength	SMYS	<i>Specified Minimum Yield Strength</i>

5. DEFINITIONS

The following words shall have these special meanings when used herein:

OWNER Owner of the Plant is defined as PT Kilang Pertamina Internasional.

shall Indicates that the statement is mandatory.

should Indicates a recommendation.

6. CODES AND STANDARDS

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references listed below, unless otherwise noted.

6.1 American Society for Testing and Materials (ASTM)

ASTM A105 Standard Specification for Carbon Steel Forgings for Piping Applications

ASTM A182 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

5. DEFINISI

Penggunaan kata-kata berikut akan memiliki arti khusus sebagai berikut:

PEMILIK Pemilik Kilang didefinisikan sebagai PT Kilang Pertamina Internasional.

shall Menunjukkan bahwa pernyataan itu wajib.

should Menunjukkan rekomendasi.


6. KODE DAN STANDAR

Pemilihan bahan dan *equipment*, serta desain, konstruksi, pemeliharaan, dan perbaikan *equipment* dan fasilitas yang tercakup dalam standar ini harus sesuai dengan edisi terbaru dari referensi yang tercantum di bawah ini, kecuali dinyatakan lain

6.1 *American Society for Testing and Materials (ASTM)*


ASTM A105 *Standard Specification for Carbon Steel Forgings for Piping Applications*

ASTM A182 *Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-*

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			<i>Temperature Service</i>
ASTM A234	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service	ASTM A234	<i>Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service</i>
ASTM A350	Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components	ASTM A350	<i>Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components</i>
6.2	American Society of Mechanical Engineers (ASME)	6.2	<i>American Society of Mechanical Engineers (ASME)</i>
ASME B16.11	Forged Steel Fittings, Socket-Welding and Threaded	ASME B16.11	<i>Forged Steel Fittings, Socket-Welding and Threaded</i>
ASME B1.20.1	Pipe Threads, General Purpose (Inch)	ASME B1.20.1	<i>Pipe Threads, General Purpose (Inch)</i>
ASME B16.25	Buttwelding Ends	ASME B16.25	<i>Buttwelding Ends</i>
ASME 16.3	Malleable Iron Threaded Fittings	ASME 16.3	<i>Malleable Iron Threaded Fittings</i>
ASME B16.9	Factory-Made Wrought Buttwelding Fittings	ASME B16.9	<i>Factory-Made Wrought Buttwelding Fittings</i>
ASME B31.1	Power Piping	ASME B31.1	<i>Power Piping</i>
ASME B31.3	Process Piping	ASME B31.3	<i>Process Piping</i>
ASME B31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids	ASME B31.4	<i>Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids</i>

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ASME B31.8	Gas Transmission and Distribution Piping Systems	ASME B31.8	<i>Gas Transmission and Distribution Piping Systems</i>
ASME SEC VIII D2	Pressure Vessels, Alternative Design	ASME SEC VIII D2	<i>Pressure Vessels, Alternative Design</i>
6.3	American Petroleum Institute (API)	6.3	<i>American Petroleum Institute (API)</i>
API STD 602	Compact Steel Gate Valves - Flanged, Threaded, Welding, and Extended-Body Ends	API STD 602	<i>Compact Steel Gate Valves - Flanged, Threaded, Welding, and Extended-Body Ends</i>
6.4	Manufacturers Standardization Society (MSS)	6.4	<i>Manufacturers Standardization Society (MSS)</i>
MSS SP-43	Wrought Stainless Steel Butt-Welding Fittings for Low Pressure, Corrosion Resistant Applications	MSS SP-43	<i>Wrought Stainless Steel Butt-Welding Fittings for Low Pressure, Corrosion Resistant Applications</i>
MSS SP-75	High Test Wrought Butt Welding Fittings	MSS SP-75	<i>High Test Wrought Butt Welding Fittings</i>
MSS SP-79	Socket-Welding Reducer Inserts	MSS SP-79	<i>Socket-Welding Reducer Inserts</i>
MSS SP-83	Class 3000 and 6000 Pipe Unions, Socket Welding and Threaded (Carbon Steel, Alloy Steel, Stainless Steels, and Nickel Alloys)	MSS SP-83	<i>Class 3000 and 6000 Pipe Unions, Socket Welding and Threaded (Carbon Steel, Alloy Steel, Stainless Steels, and Nickel Alloys)</i>
MSS SP-95	Swaged (d) Nipples and Bull Plugs	MSS SP-95	<i>Swaged (d) Nipples and Bull Plugs</i>
MSS SP-97	Integrally Reinforced Forged Branch Outlet Fittings-Socket Welding, Threaded, and Buttwelding Ends	MSS SP-97	<i>Integrally Reinforced Forged Branch Outlet Fittings-Socket Welding, Threaded, and Buttwelding Ends</i>

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6.5 Owner Reference Documents

RP-ETS-PIP-GS-0002	Piping General Design
RP-ETS-PSE-DP-0010	Active Fire Protection
RP-ETS-PIP-GS-0005	Selection of Piping Valves
RP-ETS-PIP-GS-0009	Pipe, Flange and Fitting Material Requirements
RP-ETS-PIP-GS-0017	Selection of Flanges, Stud Bolts and Gaskets

6.5 Dokumen Referensi Pemilik

RP-ETS-PIP-GS-0002	<i>Piping General Design</i>
RP-ETS-PSE-DP-0010	<i>Active Fire Protection</i>
RP-ETS-PIP-GS-0005	<i>Selection of Piping Valves</i>
RP-ETS-PIP-GS-0009	<i>Pipe, Flange and Fitting Material Requirements</i>
RP-ETS-PIP-GS-0017	<i>Selection of Flanges, Stud Bolts and Gaskets</i>

7. WELDED JOINTS

7.1 Pipe Welds

Welds in metallic piping shall conform to the requirements of the applicable codes & standards


- 7.1.1. When wall thickness ratio of joined pipes is less than or equal to 1.5, joint design details shall comply with the respective ASME B31 design code.
- 7.1.2. When wall thickness ratio of joined pipes is greater than 1.5, end preparations and geometry shall comply with ASME B16.25 "Butt Welding Ends."
- 7.1.3. When the wall thickness of the fitting or pipe at the welding end exceeds the wall thickness of the matching pipe resulting in an unequal external and/or internal diameters, the welded joint design shall comply with Figure 434.8.6-2 (a) of ASME B31.4 (regardless of the design code).

7. SAMBUNGAN LAS

7.1 Pipe Weld

Pengelasan pada *metallic piping* harus sesuai dengan persyaratan kode & standar yang berlaku

- 7.1.1. Apabila rasio ketebalan dinding pipa yang disambung kurang dari atau sama dengan 1,5, detail desain sambungan harus sesuai dengan *design code* ASME B31 masing-masing.
- 7.1.2. Apabila rasio ketebalan dinding pipa yang disambung lebih besar dari 1,5, persiapan diujung sambungan dan geometri harus sesuai dengan ASME B16.25 "*Butt Welding Ends.*"
- 7.1.3. Apabila ketebalan dinding dari *fitting* atau pipa diujung lasan melebihi ketebalan dinding pipa yang akan disambungkan menghasilkan diameter luar dan/ atau diameter dalam yang tidak sama, maka desain sambungan las harus sesuai dengan Gambar 434.8.6-2 (a) dari

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ASME B31.4 (terlepas dari kode desain apapun yang digunakan)

7.2 Socket Welds

- 7.2.1. The maximum size of socket-welded joints in hazardous services shall be 1½-inch for new construction. Maximum 2-inch may be used in hazardous service for maintenance, minor field modifications of existing piping systems, and when necessary to match existing equipment connections.
- 7.2.2. For sour service, socket-welded joints should be avoided. In case they could not be avoided, the maximum size of socket-welded joints shall be 1-inch.
- 7.2.3. Socket weld joints are not permitted in location where high vibration can occur (such as high velocity gas control valves and reciprocating pumps).
- 7.2.4. The axial gap between male and female component, as shown in Figure 328.5.2C of ASME B31.3 code, shall be maximum of 3 mm and minimum of 1.5 mm. This gap is required prior to welding.

7.3 Fillet Welds


The use of sleeve couplings per applicable codes & standards shall be limited to cement lined pipe in water services such as firefighting piping systems and oily water service.

7.2 Socket Weld

- 7.2.1. Ukuran sambungan *socket welding* untuk *hazardous service* harus maksimum 1½ inci untuk konstruksi baru. Ukuran maksimum 2 inci boleh digunakan pada *hazardous service* untuk pemeliharaan, modifikasi kecil dari *piping system* di lapangan, dan bila diperlukan untuk mencocokkan koneksi peralatan *existing*.
- 7.2.2. Untuk *sour service*, sambungan las jenis *socket (socket-welded)* harus dihindari. Jika tidak dapat dihindari, ukuran *socket-welded* tersebut maksimum 1 inci.
- 7.2.3. Sambungan las soket (*socket weld*) tidak diizinkan pada lokasi di mana vibrasi tinggi dapat terjadi (seperti pada *control valve* gas kecepatan tinggi dan *reciprocating pump*).
- 7.2.4. *Gap* aksial antara komponen *male* dan *female*, seperti ditunjukkan pada Gambar 328.5.2C dari kode ASME B31.3, harus dibatasi maksimum 3 mm dan minimum 1,5 mm. *Gap* sesuai batasan ini harus dipenuhi sebelum dilakukan pengelasan.

7.3 Fillet Weld

Penggunaan *sleeve coupling* seperti tercantum pada kode & standar yang berlaku harus dibatasi untuk pipa berlapis semen (*cement lined pipe*) dalam aplikasi *water service* seperti *piping system* pemadam kebakaran dan *oily water service*.

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8. PROHIBITED PIPING JOINTS AND COMPONENTS

The following piping components are not allowed and shall not be used in pressure piping system:

- a. Caulked joints;
- b. Soldered, brazed, and braze-welded joints;
- c. Expanded joints: They are slip on type of joints using O-ring to seal the pressure;
- d. Bell-type and packed joints unless otherwise specified in this standard document.

9. THREADED JOINTS

- 9.1 The thread joints shall be taper pipe thread (NPT) conforming to ASME B1.20.1 unless otherwise required by specifications for specific connections. Threaded connections for fire services are exempted and shall be in accordance with RP-ETS-PSE-DP-0010 Active Fire Protection.
- 9.2 In hazardous services, the maximum size of threaded connections shall be 1½-inch for standard fittings and valves, and 2-inch maximum when required for maintenance, or minor field modifications of existing piping systems, or to match threaded specialty devices such as scraper signals and access fittings for corrosion monitoring. Threaded connection shall not be used in hydrogen service.
- 9.3 In non-hazardous services, the maximum size of threaded connections shall be 3-inch for standard fittings and valves, and 4-inch maximum on special items such as fire


8. PIPING JOINT DAN COMPONENT YANG DILARANG

Komponen *piping* berikut tidak diperbolehkan dan tidak boleh digunakan pada sistem *piping* bertekanan:

- a. *Caulked joint*;
- b. *Soldered, brazed, dan braze-welded joint*;
- c. *Expanded joint*: Merupakan sambungan tipe slip on yang menggunakan O-ring untuk menahan tekanan.
- d. Sambungan *bell-type* dan *packed joint* kecuali ditentukan lain pada dokumen standar ini.

9. SAMBUNGAN ULIR

- 9.1 Sambungan ulir harus berupa ulir pipa meruncing (NPT) sesuai ASME B1.20.1 kecuali ditentukan lain pada spesifikasi untuk sambungan khusus. Sambungan berulir untuk *fire service* dikecualikan dan harus sesuai dengan RP-ETS-PSE-DP-0010 *Active Fire Protection*.
- 9.2 Pada *hazardous service*, ukuran sambungan ulir harus maksimum 1½ inci untuk standar *fitting* dan *valve*, dan maksimum 2 inci bila diperlukan untuk pemeliharaan, atau modifikasi kecil di lapangan dari sistem perpipaan *existing*, atau untuk mencocokkan perangkat khusus berulir seperti *scraper signal* dan akses *fitting* untuk pemantauan korosi. Sambungan berulir tidak boleh digunakan pada *hydrogen service*.
- 9.3 Pada *non-hazardous service* ukuran sambungan ulir harus maksimum 3 inci untuk standar *fitting* dan *valve*, dan maksimum 4 inci untuk item khusus

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hydrants unless a larger size is approved by the assigned Chairman, Piping Standards and Procedures Committee for the specific application.

- 9.4 The minimum length of the engaged threads pipe shall meet the requirements of ASME B1.20.1 for taper pipe thread. The minimum number of engaged pipe threads shall meet the requirements of Table 1.

seperti *fire hydrant* kecuali ukuran yang lebih besar disetujui oleh *Chairman* yang bertugas, *Piping Standard* dan *Procedure Committee* untuk aplikasi khusus.

- 9.4 Panjang minimum ulir pipa yang berkontak harus memenuhi persyaratan ASME B1.20.1 untuk ulir pipa runcing. Jumlah minimum ulir pipa yang berkontak harus memenuhi persyaratan **Tabel 1**.

Table 1 – Thread Engagement Requirements for Taper Pipe Threads

Tabel 1 – Persyaratan Ulir yang Berkontak untuk Ulir Pipa Runcing

Nom. Pipe Size Ukuran pipa nominal	Number of Threads Engaged Jumlah ulir yang berkontak
1/2" & 3/4"	6
1" through 1-1/2"	7
2" through 3"	8
4"	10

- 9.5 PTFE (Teflon) tape shall not be used for service temperature greater than 204°C on threaded connections.

- 9.5 PTFE *tape* (teflon) tidak boleh digunakan pada sambungan berulir untuk suhu servis diatas 204°C.

10. FLANGED JOINTS


- 10.1 Flanged connections shall be avoided when butt-welded joints can be used in services and locations where leaks are likely to occur (e.g., cyclic or vibration services), or will cause serious hazard (e.g., potentially toxic material), or are difficult to control, such as the following:

- a. Steam in ASME class 900 pressure rating
- b. In the fully restrained portion of cross-country pipelines and in underwater pipelines

10. SAMBUNGAN FLANGE

- 10.1 Sambungan *flange* harus dihindari jika sambungan las *butt-weld* dapat diterapkan pada *service* dan lokasi di mana kemungkinan besar terjadi kebocoran (misalnya, kondisi servis *cyclic* atau vibrasi), atau akan menyebabkan bahaya serius (misalnya, fluida yang berpotensi beracun), atau sulit untuk dikendalikan, seperti berikut ini:

- a. Steam pada *pressure rating* ASME class 900
- b. *Cross-country pipeline* pada bagian yang masih dapat terkendali penuh dan di pipeline bawah air tanah.

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| <p>c. In locations where the piping will be subjected to large bending or other external loads</p> <p>d. On buried piping system</p> <p>10.2 Flanged connections with long exposed bolts for sandwiched components, other than standard spectacle plates and blinds, shall not be used in fire hazardous areas unless the bolting is protected by a fire resistant shield.</p> <p>10.3 Selection of flanges shall be in accordance with RP-ETS-PIP-GS-0017 Selection of Flanges, Stud Bolts and Gaskets.</p> | <p>c. Lokasi di mana piping akan mengalami pembengkokan/ pelengkungan yang besar atau mengalami beban eksternal lainnya.</p> <p>d. <i>Piping system</i> yang ditanam dalam tanah.</p> <p>10.2 Sambungan <i>flange</i> dengan baut panjang terbuka untuk pengencangan komponen yang bertangkup/ saling menutup, selain <i>standard spectacle plate</i> dan <i>blind</i>, tidak boleh digunakan pada area <i>fire-hazard</i> kecuali sambungan bautnya dilindungi dengan pelindung tahan api.</p> <p>10.3 Pemilihan <i>flange</i> harus sesuai dengan dokumen RP-ETS-PIP-GS-0017 <i>Selection of Flanges, Stud Bolts and Gaskets</i>.</p> |
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11. SEAL WELDING OF THREADED JOINTS

- 11.1 Seal welds are permitted to be used to prevent leakage of threaded joints. It shall not be considered as contributing factor to the strength of the threaded joints.
- 11.2 Seal welding of all threaded joints up to the first block valve is required in the following services and applications:
- All hydrocarbons.
 - Boiler feed water, condensate, and steam systems utilizing ASME Class 300 and higher flange ratings.
 - Toxic materials such as chlorine, phenol, hydrogen sulphide, etc.
 - Corrosive materials such as acid,

11. SEAL WELDING PADA SAMBUNGAN ULIR

- 11.1 *Seal weld* diizinkan untuk digunakan dalam mencegah kebocoran sambungan berulir. Namun *seal weld* ini tidak boleh dianggap sebagai faktor pendukung kekuatan sambungan ulir tersebut.
- 11.2 *Seal welding* dari semua sambungan berulir hingga *block valve* pertama diperlukan pada servis dan aplikasi berikut:
- Semua *hydrocarbon*
 - Boiler feed water, condensate, dan steam system* yang menggunakan *flange* ASME Class 300 atau flange rating yang lebih tinggi.
 - Fluida beracun seperti chlorine, phenol, hydrogen sulphide, dan lain-lain.
 - Fluida yang korosif seperti acid,

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caustic, etc.

- e. Oilfield chemicals (e.g., corrosion inhibitors, emulsifiers, electrolytes, etc.)
- f. Piping which is subject to vibration, whether continuous or intermittent

11.3 Seal welding is not required for the following services and applications:

- a. Thermowells
- b. Bar stock plugs downstream of a seal-welded block valve.
- c. Special devices such as access fittings and scraper signals.
- d. Joints which require frequent disassembly and are located downstream of a seal welded block valve, e.g., sample connections.
- e. Instrument piping downstream of the primary instrument isolation valve.
- f. Pipe union ring threads and joints with elastomer o-rings.
- g. Threaded joints, downstream of a seal welded root valve, which discharge directly to an open drainage system or to the atmosphere.
- h. Extended body valves with integrally reinforced welding end per API STD 602

11.4 Where seal welding is required, the seal weld shall be a fillet weld going from the outer diameter of the female part, and it should be smooth with slight concavity as allowed by ASME B31, to the male part covering all exposed threads without undercut.


caustic, dan lain-lain.

- e. *Oilfield chemical* (seperti inhibitor korosi, emulsifier, elektrolit, dan lain-lain)
- f. *Piping* yang mengalami vibrasi secara terus-menerus maupun intermittent.

11.3 *Seal welding* tidak diperlukan untuk servis dan aplikasi berikut :

- a. *Thermowell*
- b. *Bar stock plug* di *downstream* dari *block valve* yang dilakukan *seal weld*
- c. Peralatan khusus seperti *access fitting* dan *scraper signal*.
- d. Sambungan yang sering memerlukan pembongkaran dan lokasinya di *downstream* dari *block valve* yang dilakukan *seal weld*, misalnya *sample connection*.
- e. *Instrument piping* di *downstream* dari *isolation valve* utama untuk instrumen.
- f. *Pipe union ring thread* dan sambungan yang menggunakan *elastomer o-ring*.
- g. *Sambungan berulir*, di *downstream* dari *root valve* yang dilakukan *seal weld*, yang mengalirkan langsung ke sistem drainase terbuka atau ke atmosfer.
- h. *Valve tipe extended body* yang ujung pengelasannya diperkuat secara integral/ keseluruhan sesuai API STD 602.

11.4 Ketika *seal weld* diperlukan, *seal weld* harus berupa *fillet weld* dari diameter luar bagian *female*, dan harus *smooth* dengan *slight concavity* sebagaimana diperbolehkan oleh ASME B31, ke bagian *male* yang menutupi semua ulir terbuka tanpa *undercut*.

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11.5 PTFE (Teflon) tape or joint compounds shall not be used in threaded connections requiring seal welding.

11.5 *Tape* atau *compound* gabungan berbahan PTFE (teflon) tidak boleh digunakan pada sambungan ulir yang memerlukan *seal weld*.

12. PIPE FITTINGS GENERAL REQUIREMENTS

12.1 All metallic pipe fittings shall be fully compatible with the adjoining pipe and shall be subject to the limitations of RP-ETS-PIP-GS-0009 for carbon steel line pipe.

12. PERSYARATAN UMUM PADA PIPE FITTING

12.1 Semua *metallic pipe fitting* harus sepenuhnya kompatibel dengan pipa yang akan disambungkan dan harus mengikuti batasan-batasan pada dokumen RP-ETS-PIP-GS-0009 untuk *carbon steel line pipe*.

12.2 For service with design minimum temperature between minus 18°C to minus 45°C, the fittings shall comply with applicable codes & standards.

12.2 Untuk servis dengan desain suhu minimum antara -18°C hingga -45°C, maka *fitting* harus memenuhi syarat kode & standar yang berlaku.

13. THREADED AND SOCKET WELDING FITTINGS

13.1 For steel piping in hazardous services, threaded and socket welding fittings shall conform to ASME B16.11 Class 3000, Class 6000 or higher.

13. FITTING BERULIR DAN SOCKET WELDING

13.1 Untuk *steel piping* dalam *hazardous service*, maka *fitting* berulir dan *socket welding* harus sesuai dengan ASME B16.11 *Class 3000*, *Class 6000* atau lebih tinggi

13.2 Pipe unions in hazardous services shall be limited to Class 3000 threaded or socket welding forged steel unions in accordance with MSS SP-83. The material shall be carbon steel per ASTM A105, ASTM A350 or alloy steel per ASTM A182.


13.2 *Pipe union* dalam *hazardous service* harus dibatasi pada *forged steel union* berulir atau *socket welding* dengan *Class 3000* sesuai MSS SP-83. Bahan yang digunakan harus *carbon steel* sesuai ASTM A105, ASTM A350 atau *alloy steel* sesuai ASTM A182.

13.3 Pipe unions shall not be installed in the pipe section between the main pipe run and root valve.

13.3 *Pipe union* tidak boleh dipasang pada bagian pipa antara jalur pipa utama dan *root valve*.

13.4 Threaded bushings with one size reduction shall not be used. When bushings are allowed, only hex head steel bushings shall be used. Flush steel bushings are not

13.4 *Bushing* berulir dengan *reduction* satu ukuran tidak boleh digunakan. Jika *bushing* diaplikasikan, hanya jenis *hex head steel bushing* yang boleh digunakan.

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permitted.

13.5 Welding bosses shall be forged steel ASTM A105, ASTM A350 or ASTM A182, as applicable, as shown on Pertamina Standard.

13.6 Integrally reinforced welding outlets of approved design (such as Weldolets, Thredolets, Sockolets, etc.) in Class 3000, 6000 or higher, as applicable, which abut the pipe wall with a full penetration weld are acceptable.

13.7 Malleable iron screwed fittings shall conform to ASME B16.3 Class 150 and shall be galvanized and limited to non-hazardous services, except that pipe unions shall be Class 300.

13.8 Pipe plugs for use in metallic piping shall be solid body, bar-stock, or forged steel plugs in accordance with ASME B16.11.

Flush steel bushing tidak boleh digunakan.

13.5 *Welding boss* harus berbahan *forged steel* ASTM A105, ASTM A350 atau ASTM A182, sebagaimana berlaku, seperti ditunjukkan pada Standar Pertamina.

13.6 *Welding outlet* yang diperkuat secara integral dari desain yang telah disetujui (seperti *Weldolet*, *Thredolet*, *Sockolet*, dan lain-lain) pada *Class* 3000, 6000 atau lebih tinggi, sebagaimana berlaku, yang berbatasan dengan dinding pipa yang dilas dengan penetrasi penuh, dapat diterima.

13.7 *Fitting* ulir berbahan *malleable iron* harus sesuai ASME B16.3 *Class* 150 dan harus diberikan galvanis dan dibatasi penggunaannya untuk *non-hazardous service*, kecuali *pipe union* harus *Class* 300.

13.8 *Plug* pipa yang digunakan pada *metallic piping* harus berupa *solid body*, *bar stock*, atau *forged steel plug* sesuai dengan ASME B16.11.

14. STEEL BUTT WELDING FITTINGS

14.1 The material and purchasing requirements of carbon steel buttweld fittings to: ASTM A234 Grade WPB and MSS SP-75 shall conform to the requirements of applicable codes & standards.

14.2 Integrally reinforced welding outlets shall be of a design approved by Owner. Refer to Owner Standards for Post Weld Heat Treatment requirements for welding outlets.


14.3 Miter elbows are not permitted. In case miter bends have to be used prior approval by Owner is required.

14. FITTING PADA STEEL BUTT WELDING

14.1 Persyaratan bahan dan pembelian *carbon steel fitting* tipe *buttweld* untuk ASTM A234 Grade WPB dan MSS SP-75 harus memenuhi persyaratan kode & standar yang berlaku

14.2 *Welding outlet* yang diperkuat secara integral harus dari desain yang disetujui oleh Pemilik. Mengacu pada Standar Pemilik tentang persyaratan PWHT untuk *welding outlet*.

14.3 *Miter elbow* tidak diizinkan. Jika *miter bend* harus digunakan, diperlukan persetujuan sebelumnya dari Pemilik.

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15. BRANCH CONNECTION TYPE AND FITTINGS

15.1 Selection of the tee branch connections type and fittings shall be as follows:

- 15.1.1. For new construction of metallic piping selection shall be made in accordance with the Material Class.
- 15.1.2. In case a branch connection with reinforcement has been selected according to paragraph 15.1.1, the size of the reinforcement pad shall be per the applicable code.
- 15.1.3. For field modifications to existing piping, the branch connections as standard with proper reinforcement are acceptable.

15.2 Laterals and Crosses

- 15.2.1. Crosses are not permitted. Laterals shall be used only when required by Owner standards. They should be used for low pressure system (less than 150 psig) such as flare lines.
- 15.2.2. Laterals fittings shall be designed for a bursting strength at least equal to the bursting strength of the adjoining pipe.
- 15.2.3. Laterals made by welding the branch pipe directly to the run pipe shall be designed according to the code and shall have complete encirclement reinforcement. Laterals shall be shop fabricated according to Owner Standard and


15. TIPE SAMBUNGAN CABANG DAN FITTING

15.1 Pemilihan jenis sambungan cabang *tee* dan *fitting* harus dilakukan sebagai berikut:

- 15.1.1. Untuk konstruksi baru *metallic piping*, pemilihan pipa harus dilakukan sesuai dengan *Material Class*.
- 15.1.2. Jika sambungan cabang dengan *reinforcement* telah ditetapkan sesuai paragraf 15.1.1, maka ukuran *reinforcement pad* harus sesuai dengan kode yang berlaku.
- 15.1.3. Untuk modifikasi di lapangan pada *existing piping*, maka sambungan cabang sebagai standar dengan *reinforcement* yang tepat dapat diterima.

15.2 Lateral dan Persilangan

- 15.2.1. Persilangan tidak diizinkan. Lateral harus digunakan hanya ketika dibutuhkan berdasarkan standar Pemilik. Lateral sebaiknya digunakan untuk sistem tekanan rendah (kurang dari 150 psig) seperti *flare line*.
- 15.2.2. *Fitting* lateral harus dirancang untuk *bursting strength* setidaknya sama dengan *bursting strength* dari pipa yang berdampingan.
- 15.2.3. *Lateral* yang dibuat dengan mengelas pipa cabang langsung ke *run pipe* harus dirancang sesuai dengan kode dan harus memiliki *reinforcement* lingkaran penuh. Lateral harus dibuat di *shop* sesuai Standar Pemilik dan

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subjected to minimum 90% SMYS hydrotest pressure.

- 15.2.4. Branch connections, such as those for drain and vent connections, on tees, elbows and reducers are not permitted. When not avoidable, the piping design shall be reviewed and approved by the Owner.

dilakukan *hydrotest* pada tekanan minimal 90% SMYS.

- 15.2.4. Sambungan cabang, seperti sambungan *drain* dan ventilasi, pada *tee*, *elbow*, dan *reducer* tidak diizinkan. Bila tidak dapat dihindari, desain *piping* harus dilakukan *review* dan disetujui oleh Pemilik.