



GoM Region Hot Bolting Safe Work Practice (SWP)

1 Purpose/Scope

The purpose of this Safe Work Practice (SWP) is to outline the requirements for conducting safe Hot Bolting operations.

2 Procedures

2.1 Hot Bolting

Hot Bolting allows for corroding studs and nuts to be removed as part of preventative maintenance while the line is in service. A risk assessment shall be performed prior to Hot Bolting to confirm the flange will not leak or fail during the procedure.

Nuts/studs shall be removed and replaced immediately, one at a time, in a specified cross-bolting sequence/pattern.

WARNING:

1. Prior to removing any nut/stud, all existing nuts/studs shall be checked for tightness by torquing the flanged joint to the manufacturer specifications.
2. Hot Bolting and Hot Work are not allowed within 100 feet of each other.

All new studs and nuts shall be torqued according to the manufacturer's specifications.

A BP representative shall be present during all Hot Bolting activities.

Working on live piping and equipment should only be done when the advantages have been assessed against the potential risks. The risk assessment shall include a review of:

- Design specifications of the flanged joint, including bolting and gasket specifications.
- Contents of the piping or equipment (e.g., the flammability and/or toxicity of the process fluid).
- Design and operating pressures and temperatures; confirming that the pressure in the piping/equipment is at the specified reduced value and that the process conditions are stable.
- The possibility and consequences of a process upset occurring.

NOTE: The location and condition of the nearest upstream and downstream isolation valves relative to the joint shall be identified prior to commencing the work.

- The position and functionality of pipe supports relative to the flanged joint.

NOTE: From a mechanical standpoint, there should be no unacceptably high external loads and/or bending moments acting on the joint nor should be no significant vibration of the piping at the joint.

- The position and type of flexible expansion joint affecting the flanged joint.
- Maintenance history of the joint.
- Personnel access and egress-consideration should be given to the accessibility of the area and to confirming that adequate escape routes are available should the pipe spring or should leakage occur.

WARNING: Hot Work (cutting or burning) on seized nuts/studs, shall not be allowed on flanges in service. Cold cutting is permissible and should be considered.

- Possible degradation of the nuts/studs (e.g., corrosion, stress corrosion cracking, fatigue).
- Possible degradation of the gasket.

2.1.1 Potential Risk of Leakage

In Hot Bolting, there is a potential risk of leakage caused by:

- Reduced gasket compression during bolt removal,
- Inadequate tightening on bolt replacement, or
- Gasket failure from over-tightening of bolts on replacement

2.1.2 Allowable Flanges

The practice of Hot Bolting shall only be allowed for those flanges indicated in Table 1 (ANSI class flanges) and Table 2 (API class flanges).

NOTE:

1. Some flanges require a decreased pressure rating during Hot Bolting (from 9 percent to 72 percent less than normal pressure rating) or are not allowed at all (ANSI 150 class flanges). Use Table 1 and Table 2 in conjunction with Hot Bolting safety practices to enhance personnel safety and code compliance.
2. Flat-face flanges are not addressed in this manual. If Hot Bolting is necessary, a Management of Change and hazard assessment shall be performed.
3. [For pressure class 150, 4-bolt flanges in utility service only, hot bolting maybe performed by utilizing Hot Bolt clamps, referenced specification 1400-20-IM-PR-0001.](#)
[All other pressure classes, flange sizes or services, 1400-20-IM-PR-0001 is not applicable.](#)

Table 1: ANSI Class Flanges

Normal Pipe Size	ANSI Class	Flange Type*	Normal Bolt Count	Normal PSI Max	Hot Bolt PSI Max	Hot Bolt Allowed	Comments
2"	150	RF	4	285	-	No	Insufficient gasket-seat force without use of hot bolt clamp per 1400-20-IM-PR-0001
2"	300	RF	8	740	740	Yes	
2"	600	RF	8	1480	1480	Yes	
2"	600	RJ	8	1480	1480	Yes	Not available. Use 2 ANSI 1500
2"	900	RJ	-	-	-	-	
2"	1500	RJ	8	3705	2850	Yes	23% pressure reduction
2"	2500	RJ	8	6170	3700	Yes	40% pressure reduction

3"	150	RF	4	285	-	No	Insufficient gasket-seating force without use of hot bolt clamp per 1400-20-IM-PR-0001
3"	300	RF	8	740	740	Yes	
3"	600	RF	8	1480	1325	Yes	10% pressure reduction
3"	600	RJ	8	1480	1325	Yes	10% pressure reduction
3"	900	RJ	8	2220	1975	Yes	10% pressure reduction
3"	1500	RJ	8	3705	2223	Yes	30% pressure reduction
3"	2500	RJ	8	6170	3680	Yes	40% pressure reduction
4"	150	RF	8	285	-	No	Insufficient gasket-seating force
4"	300	RF	8	740	740	Yes	
4"	600	RF	8	1480	1350	Yes	9% pressure reduction
4"	600	RJ	8	1480	1350	Yes	9% pressure reduction
4"	900	RJ	8	2220	2220	Yes	
4"	1500	RJ	8	3705	3705	Yes	
6"	150	RF	8	285	-	No	Insufficient gasket-seating force
6"	300	RF	12	740	740	Yes	
6"	600	RF	12	1480	1480	Yes	
6"	600	RJ	12	1480	1480	Yes	
6"	900	RJ	12	2220	2220	Yes	
6"	1500	RJ	12	3705	3705	Yes	
8"	150	RF	8	285	-	No	Insufficient gasket-seating force
8"	300	RF	12	740	740	Yes	
8"	600	RF	12	1480	1325	Yes	10% pressure reduction
8"	600	RJ	12	1480	1325	Yes	10% pressure reduction
8"	900	RJ	12	2220	2220	Yes	
8"	1500	RJ	12	3705	3705	Yes	
10"	150	RF	12	285	-	No	Insufficient gasket-seating force
10"	300	RF	16	740	740	Yes	
10"	600	RF	16	1480	1480	Yes	
10"	600	RJ	16	1480	1480	Yes	
12"	150	RF	12	285	-	No	Insufficient gasket-seating force
12"	300	RF	16	740	740	Yes	
12"	600	RF	20	1480	1480	Yes	
12"	600	RJ	20	1480	1480	Yes	
16"	150	RF	16	285	-	No	Insufficient gasket-seating force
16"	300	RF	20	740	740	Yes	
16"	600	RF	20	1480	1350	Yes	9% pressure reduction
16"	600	RJ	20	1480	1480	Yes	

Normal Pipe Size	ANSI Class	Flange Type*	Normal Bolt Count	Normal PSI Max	Hot Bolt PSI Max	Hot Bolt Allowed	Comments
18"	150	RF	16	285	-	No	Insufficient gasket-seating force 16% pressure reduction
18"	300	RF	24	740	740	Yes	
18"	600	RF	20	1480	1250	Yes	
18"	600	RJ	20	1480	1480	Yes	
20"	150	RF	20	285	-	No	Insufficient gasket-seating force 12% pressure reduction
20"	300	RF	24	740	740	Yes	
20"	600	RF	24	1480	1300	Yes	
20"	600	RJ	24	1480	1480	Yes	
24"	150	RF	20	285	-	No	Insufficient gasket-seating force 12% pressure reduction
24"	300	RF	24	740	740	Yes	
24"	600	RF	24	1480	1300	Yes	
24"	600	RJ	24	1480	1480	Yes	

Table 2: API Class Flanges

Normal Pipe Size	ANSI Class	Flange Type*	Normal Bolt Count	Normal PSI Max	Hot Bolt PSI Max	Hot Bolt Allowed	Comments
1-13/16"	10K	RJ	8	10000	4100	Yes	59% pressure reduction
1-13/16"	10K	RJ	8	15000	5700	Yes	62% pressure reduction
2-1/16"	5K	RJ	8	5000	2900	Yes	42% pressure reduction
2-1/16"	10K	RJ	8	10000	3350	Yes	67% pressure reduction
2-1/16"	15K	RJ	8	15000	4650	Yes	69% pressure reduction
2-9/16"	5K	RJ	8	5000	3150	Yes	37% pressure reduction
2-9/16"	10K	RJ	8	10000	3350	Yes	67% pressure reduction
2-9/16"	15K	RJ	8	15000	4400	Yes	71% pressure reduction
3-1/8"	5K	RJ	8	5000	2850	Yes	43% pressure reduction
3-1/8"	10K	RJ	8	10000	3300	Yes	67% pressure reduction
3-1/8"	15K	RJ	8	15000	4400	Yes	71% pressure reduction
4-1/16"	5K	RJ	8	5000	2750	Yes	45% pressure reduction
4-1/16"	10K	RJ	8	10000	2800	Yes	72% pressure reduction
4-1/16"	15K	RJ	8	15000	4400	Yes	71% pressure reduction
5-1/8"	5K	RJ	8	5000	3075	Yes	39% pressure reduction
5-1/8"	10K	RJ	12	10000	3100	Yes	69% pressure reduction
7-1/16"	5K	RJ	12	5000	3300	Yes	34% pressure reduction
7-1/16"	10K	RJ	12	10000	3400	Yes	66% pressure reduction
7-1/16"	15K	RJ	16	15000	4650	Yes	69% pressure reduction

NOTE: Pressure ratings are for API 6B and 6BX flanges made of American Society for Testing Materials (ASTM) A-105 material (for API 6B flanges 5K rating or less) or AIS 4130 (for API 6BX flanges 10K and 15K rating) at -20°F to 200°F, and with A193 Grade B7 bolts. Calculations are in accordance with ANSI B31.3.

*Above tables refer to weld neck flanges

3 Key Documents

[ANSI B31.3, Petroleum Refining Piping](#)

[API 6B, Flanges](#)

[API 6BX, Flanges](#)

Revision Log

Revision Date	Authority	Custodian	Revision Details
04/06/15	Ken DeJohn / Ken Gottselig / Steve Laws	Sr. Mechanical Engineer	Added: 1) Note 3 under section 2.1.2 2) Comment "without use of hot bolt clamp per 1400-20-IM-PR-0001" of table 1 ANSI Class Flanges
12/11/14	Discipline Engineering Manager	Sr. Mechanical Engineer	Updated document with new Authority & Owner
06/15/12	GoM H&S Director	GoM Safety Programs Lead	Reformatted document to meet new GoM document control template standardization guidelines.
05/01/09	GoM HSSE Director	GoM HSSE Programs Manager	Table 1, the Comment "Not available, use 2 ANSI 1500" on Line with 2" Pipe Size, 600 ANSI Class, RJ should be moved down one line to correspond with 2", 900, RJ line.
06/01/08	GoM HSSE Director	GoM HSSE Programs Manager	Formatting and minor edits for clarification
02/28/06	S. Garner/ S. Tink/ R. DeLeonardis/ C. Jackson	Kathy Kanocz	Added guidance on risk assessment. Added more sizes and ratings based on engineered calculations. Changed CD # from 10097 to UPS-US-SW-GOM-HSE-DOC-00112-2 to conform to new numbering nomenclature in the new GoM HSSE doc base. Changed 3 authorities and 1 custodian.
01/25/02	S. Garner/ B. Herbert/ R. White/ S. Flynn	Ray Britt	Initial issue as controlled document. Prior revision history located in hard-

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