



COMPANY STANDARD INSTRUCTION

Technical Instruction for Golden Joints

Instruction Number: IN-301-INT-220

Document Classification: Internal

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	Date	29 April 2020	

Rev.	Date	Prepared by	Reviewed by	
00	16 March 2020			
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  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 2 of 12

Revision / Modification History:

Rev #	Date	Section No.	Reason for revision / modification
00	16/03/20	--	New Instruction

Distribution:

Through *SharePoint*.

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  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 3 of 12

Contents

1. OBJECTIVE	4
2. SCOPE	4
3. PROCEDURE SUMMARY	4
4. ABBREVIATIONS / DEFINITIONS	4
5. DOCUMENT REFERENCES	5
6. IT SYSTEM REQUIREMENTS	5
7. RASI SUMMARY	6
8. PROCEDURE METHOD	7
8.1 APPROVAL	7
8.2 QUALITY CONTROL	8
8.3 RECORD KEEPING	9
9. RECORDS	10
10. APPENDIX	10
10.1 SERVICE LEVEL DEFINITION	10
10.2 APPENDIX 2: QUALITY CONTROL	10

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 4 of 12

1. OBJECTIVE

The objective of this technical instruction is to outline the requirements both technical as organizational to control the mechanical integrity of golden joints.

2. SCOPE

This instruction is applicable for the design and fabrication of any butt joint in relation to safety critical pressurized equipment, new build or in operation (repairs or changes), in the event a hydrostatic or pneumatic pressure test is impractical or not possible. For non-safety critical equipment this instruction is recommended.

3. INSTRUCTION SUMMARY




In case it is impractical or not possible to perform a pressure test after welding repairs a golden joint or golden weld is allowed as per ASME B31.3, ASME B31.4, and ASME B31.8. Using a golden joint is a deviation of the normal practices and standards and is only allowed under increased supervision and quality control during welding in combination with extensive NDT of the weld.

It needs to be mentioned that hydrostatic pressure testing is not solely for the validation of integrity of the new joints but in several cases also for the stress relief of the equipment.

In case a golden joint is to be used then this instruction must be followed to ensure the integrity of the joint.

4. ABBREVIATIONS / DEFINITIONS

#	Abbreviation / Key word	Definition summary
1	Golden Joint	Also referred to as golden weld, closure weld, tie-in weld, and is a weld which is not subjected to a hydrostatic pressure test and requires additional quality assurance steps to ensure integrity, as a minimum 100% RT
2	ASME	American Society of Mechanical Engineers
3	NDT	Non-Destructive Testing
4	RT	Radiographic Test
5	UT	Ultrasonic Test
6	PT	Penetrant Test
7	MPT	Magnetic Particle Test
8	IIM	Integrity & Inspection Manager

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 5 of 12

9	QM	Quality Manager
10	HOI	Head of Integrity

5. DOCUMENT REFERENCES

#	Document ID	Document name	Summary of dependency or use
1	ASME B31.3	ASME B31.3 Process Piping	Prescribes requirements for piping typically found in petroleum refineries; chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants; and related processing plants and terminals. It covers materials and components, design, fabrication, assembly, erection, examination, inspection, and testing of piping.
2	ASME B31.4	ASME B31.4 Pipeline Transportation Systems for Liquids and Slurries	Prescribes requirements for the design, materials, construction, assembly, inspection, testing, operation, and maintenance of liquid pipeline systems between production fields or facilities, tank farms, above- or belowground storage facilities, natural gas processing plants, refineries, pump stations, ammonia plants, terminals (marine, rail, and truck), and other delivery and receiving points, as well as pipelines transporting liquids within pump stations, tank farms, and terminals associated with liquid pipeline systems.
3	ASME B31.8	ASME B31.8 Gas Transmission and Distribution Piping Systems	It covers gas transmission and distribution piping systems, including gas pipelines, gas compressor stations, gas metering and regulation stations, gas mains, and service lines up to the outlet of the customer's meter set assembly.

6. IT SYSTEM REQUIREMENTS

#	IT system module name	Summary of IT system module use
1	N/A	N/A
2		
3		

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 6 of 12

7. RASCI SUMMARY

#	Instruction chapter	Plant Manager	Integrity Engineer	(Sr.) Inspector	Plant Inspector	NDT / Welding Contractor	Requester
1	Approval for cancelling hydrostatic test.	A	R	C	--	--	S
2	Quality Control of Golden weld.	A	C	R	S	S	--
3	Record keeping	A	R	--	--	--	--

Legend:




R = Responsible (the class of people who are ultimately responsible for getting the work done)

A = Accountable (the position that is accountable to oversee that the work gets done)

S = Support (the person who supports by providing information and suggest any deviations from the Procedure)

C = Consulted (the person who can advise when needed)

I = Informed (concerned persons who are required to be informed or communicate to)

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 7 of 12

8. INSTRUCTION METHOD

8.1 APPROVAL

In case it is impractical or not possible to perform a hydrostatic test a request for golden joint, following this instruction, is to be submitted, verified, and approved.

INPUTS SUMMARY

Request, accompanied with justification, welding and inspection method, for golden joint

APPROVAL




ID	Activity	Document reference	Responsible org. position
8.1.1	Initiate and motivate request	--	Requester
8.1.2	Identify hydrotest requirement	--	Integrity Engineer
8.1.3	Start Golden Joint Request	--	Integrity Engineer
8.1.4	Create welding procedure for Golden Joint	--	Welding Engineer
8.1.5	Create Inspection test plan for Golden Joint	--	Welding Engineer
8.1.6	Validate Request	--	Sr. Inspector
8.1.7	Approve Request	--	Plant Manager
8.1.8	Submit welding and inspection procedure	--	Integrity Engineer

INSTRUCTION COMMENTARY

In the event it is impractical or not possible to perform a pressure test and a weld for closure or repair is required, the responsible manager (requester) for the work can initiate the request for golden joint. In the request the requester must motivate why a hydrostatic pressure test is not possible or not recommended.

The request then is submitted to the integrity engineer who is the gatekeeper of these requests and must agree on the motivation, if he does not agree a hydrostatic test must be performed. If agreed the integrity engineer, then need to create the welding and inspection procedure for respective weld together with a welding engineer and welding inspector.

Once the golden weld procedure is created the Sr. Inspector must validate the request and if the procedure satisfies the requirements of the Sr. Inspector it can be submitted to the plant manager for approval. The plant manager then still can reject the request based on the risks associated with the system the golden weld is made.

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 8 of 12

Once approved the integrity engineer will submit the welding procedure and inspection procedure to respective departments such as, but not limited to, the requesting department, the welding contractor, the welding inspector, and the inspection department.

OUTPUTS SUMMARY

- Approved Welding procedure
- Approved Inspection procedure

Both to be used during the repairs for quality control.

8.2 QUALITY CONTROL

A golden weld can create a risk for the facility if not done properly and it is key that all steps following the weld procedure are verified. The integrity of the facility is based on the quality control rather than a test method.

INPUTS SUMMARY

- Approved Welding Procedure and
- Quality Control Procedure

QUALITY CONTROL

ID	Activity	Document reference	Responsible org. position
8.2.1	Discuss Welding Procedure with welder	--	(Sr.) Inspector
8.2.2	Discuss QC procedure with welding inspector	--	(Sr.) Inspector
8.2.3	Validate certificates and materials	--	Welding Inspector
8.2.4	Weld according to procedure	--	Welder
8.2.5	Inspect according to procedure	--	Welding Inspector
8.2.6	NDT according to procedure	--	NDT Contractor
8.2.7	Validate findings and outcomes	--	(Sr.) Inspector
8.2.8	Report fit for service	--	(Sr.) Inspector

INSTRUCTION COMMENTARY

Given the risk associated with this instruction, each step has to be performed by a well-trained and if possible certified professional and it is key that the quality control is performed as defined by the welding engineer to ensure the integrity of the weld and the facility.

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 9 of 12

OUTPUTS SUMMARY

Golden Joint, as per welding procedure

QC document, together with all inspection reports

8.3 RECORD KEEPING

Following the ASME standard, all documentation associated with the golden joint must be stored in a system, clearly related with the specific welding seam. The document must be kept for a minimum of 20 years, or up to removal of the facility.

INPUTS SUMMARY

- Approved Welding Procedure
- Approved Quality Control Procedure
- Welding inspection report
- NDT reports




QUALITY CONTROL

ID	Activity	Document reference	Responsible org. position
8.2.1	Collect field reports and NDT reports	--	Maintenance Planner
8.2.2	Review reports for completeness	--	Integrity Engineer
8.2.3	Store report at appropriate location	--	Integrity Engineer
8.2.4	Close-out Golden Joint Request	--	Integrity Engineer

INSTRUCTION COMMENTARY

OUTPUTS SUMMARY

All documents related to the golden joint stored at right location

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 10 of 12

9. RECORDS

The owner / executor of change shall maintain the following, but not limited to, records / documents for reference:

#	Document / Record ID	Document / Record name	Responsible department or section
1	N/A	Welding procedure	Integrity Management
2	N/A	QC procedure	Integrity Management
3	N/A	Field Inspection Report	Integrity Management
4	N/A	NDT Reports	Integrity Management
5	N/A	Material certificates	Integrity Management
6	N/A	Welder certification	Integrity Management
7	N/A	Golden Joint Request form	Plant
8	N/A	Engineering documents	Engineering Department

10. APPENDIX

10.1 SERVICE LEVEL DEFINITION

The key services and service levels listed below are required to complete the activities contained within this instruction

#	Service	Service level	Service provider	Service customer
1	Integrity Assessment	Zero Safety Incident	Integrity/Inspection department	Operations
2				
3				
4				
5				

10.2 APPENDIX 2: QUALITY CONTROL




Given the potential increased risks associated with a golden joint there are minimum requirements provide in this chapter which are to be used when making the golden joint itself. During the welding procedure there are four critical steps which must be validated.

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 11 of 12

1. Certification – before starting to weld the certification of the welder needs to be verified and in the event the welder does not have recent experience in welding the type of material and respective pipe thickness, test welds should be performed in the workshop. Additionally, the welding rod material must be validated. A copy of the welder certificate and the welding rod material from the box must be recorded on the inspection sheet.
2. Preparation – the surface and welding face for the golden joint needs the right preparation and there should not be any crack in the surface. After preparation the seam to be welded needs to be inspected and a 100% MPI or PT or other applicable NDT of the surfaces must be conducted.
In case the material must be preheated for welding, the surface temperature must be validated and recorded at minimum 8 points around the weld before welding can start.
3. Root layer – A key inspection is the visual inspection to the root of the weld to ensure defects such as lack of root fusion is not present. This can be achieved by leaving the final length of root bead open.
4. Top layer – the top layer of the weld is subject to a 100% MPI or PT inspection by certified contractor.
5. Service test- initial service leak test at operating pressure and temperature to be conducted to determine whether the specified golden joint is satisfied.

Apart from the above mentioned four QC points which have to be done there are other verifications which might be required and are subject to the instruction of the welding engineer. A number of additional QC items are highlighted below.

1. Controlled sequential welding to lessen the stress of the weld
2. MPT or PT of the hot pass of the weld, dependent on the pre-heat requirements of the material being welded. The root pass is never to be MPT'd or PT'd!
3. Temperature measurements and heat inputs taken at certain intervals to ensure that the welder is working within the parameters of the welding procedure
4. Joint interpass temperatures are taken at the end of each pass to ensure that the interpass temperature is in line with the welding procedure tolerances
5. MPI or PT of the closing layer of the weld after minimum 12 hours, especially for materials subject to heat stress cracking or hydrogen cracking.
6. Leak test during the first pressurization of the golden joint.

  	Technical Instruction for Golden Joints	Instruction No.	IN-301-INT-220
		Revision	00
		Date	16 March 2020
		Page No.	Page 12 of 12

10.3 APPENDIX 3: GOLDEN JOINT APPROVAL FORM

Request No:					
Project Information					
Project Title:					
Project Number:			Project Stage:		
Contractor/Vendor:					
Request Category:(Piping, Eq.)					
Plant:		Unit:		Tag/Equip:	
Design Pressure:		Design Temp.:		Process Medium:	
Reason for Requested Golden Joint (Explain why cannot comply with specifications/standards):					
Technical Justifications (Describe the benefit, impacts and measures to be taken in accepting this technical deviation):					
Initiator's Name:		Organization/Dept:			
Risk Screening					
Description of Issue or Concern:					
Current Safeguards					
Comments:					
Risk Screener (Integrity Engineer)		Name		Signature	
Head of Integrity		Name		Signature	
Risk Assessment Summary					
<input type="checkbox"/> Golden Joint is Technically Acceptable					
<input type="checkbox"/> Golden Joint is technically acceptable only if implemented with exceptions or conditions described below					
Section 3.0: Request Approval					
Plant Manager		Name		Signature	
Comments:					