

AWS D10.10/D10.10M:1999 (R2009)
An American National Standard



Recommended Practices for Local Heating of Welds in Piping and Tubing



American Welding Society



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Recommended Practices for Local Heating of Welds in Piping and Tubing

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Prepared by the
American Welding Society (AWS) D10 Committee on Piping and Tubing

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard provides information on recommended practices, equipment, temperature control, insulation, and advantages and disadvantages for the methods presently available for local heating of welded joints in pipe and tubing.



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Foreword

This foreword is not part of AWS D10.10/D10.10M:1999 (R2009), *Recommended Practices for Local Heating of Welds in Piping and Tubing*, but is included for informational purposes only.

This recommended practice is intended to supply useful information to those with a need to apply heat to welds in piping and tubing under circumstances that do not permit placing the entire component in a furnace or oven.

The first edition of the recommended practice prepared by the AWS Committee on Piping and Tubing was approved and published as AWS D10.10-75, *Local Heat Treatment of Welds in Piping and Tubing*.

The second edition, ANSI/AWS D10.10-90, was revised to bring the document abreast of the present “state-of-the-art,” and to reemphasize certain important topics; particularly, thermocouple selection and placement, proper provision for insulation, and use of the radiant heating methods.

The present edition of D10.10 has been extensively revised to: identify/consider related domestic and international codes, standards and practices; more fully recognize the range of purposes for local heating; introduce terminology for local heating; consider the issues affecting important parameters and provide recommendations for specifying these parameters; consider both local 360-degree band and spot heating; expand the information regarding thermocouple location, attachment and accuracy; expand/update the information relating to insulation; expand the information regarding the thermal cycle; identify common process deviations and responses; introduce considerations regarding service environment; introduce quality assurance system considerations; and update and emphasize the heating methods most commonly used.

During preparation of the present edition, it was attempted to include recommendations based upon the best available, most current data regarding local heating. In most cases, the recommendations given are based upon published research, with extensive references provided. It is acknowledged that in some cases, the resulting recommendations may exceed the prevailing practice within industry, especially domestically. However, it is felt that the objective of this document is to present recommended practices based on an ordered assessment of available research and information, rather than a summary of current practice.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS D10 Committee on Piping and Tubing, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

A formal reply will be issued after it has been reviewed by the appropriate personnel following established procedures.

Table of Contents

	Page No.
<i>Personnel (Reaffirmation)</i>	v
<i>Personnel (Original)</i>	vii
<i>Foreword</i>	ix
<i>List of Tables</i>	xiv
<i>List of Figures</i>	xiv
1. Scope	1
2. Reference Documents	1
2.1 Piping Fabrication Codes.....	1
2.2 Repair Codes.....	1
2.3 Recommended Practices Regarding Service Environment.....	1
3. Introduction	1
4. Purposes for Local Heating	2
4.1 Bake-Out.....	2
4.2 Preheating and Interpass Heating	3
4.3 Postheating.....	3
4.4 Postweld Heat Treatment (PWHT).....	4
5. Terminology for Local Heating	4
5.1 Soak Band (SB)	5
5.2 Heated Band (HB)	5
5.3 Gradient Control Band (GCB).....	5
5.4 Control Zone.....	6
6. Local 360-Degree Band Heating	6
6.1 Soak Band.....	6
6.2 Heated Band.....	7
6.3 Gradient Control Band.....	15
6.4 Axial Temperature Gradient	16
6.5 Summary of Recommendations for SB, HB, GCB, and Axial Temperature Gradient	17
6.6 Recommended PWHT Practices.....	18
7. Local Spot PWHT	26
7.1 Requirements in Fabrication and Repair Codes	26
7.2 Basis for Current Practices	26
7.3 Experience or Analysis to Justify Use	28
8. Measurement of Temperature	28
8.1 Temperature-Indicating Crayons and Paints.....	28
8.2 Selection of Thermocouples	28
8.3 Installation of Thermocouples	29
8.4 Location of Thermocouples.....	31
8.5 Thermocouple Extension Wires.....	32
8.6 Temperature Control and Recording Instruments.....	37
8.7 Accuracy of Thermocouple Temperature Measurements	37
9. Insulation	38
9.1 Classification of Insulation.....	38
9.2 Health and Safety Issues Regarding Fiber Respirability	38
9.3 Types of Insulation	39

9.4 Attachment of Insulation	39
10. Other Considerations	39
10.1 Structural Integrity	40
10.2 Internal Liquids.....	40
10.3 Internal Convection.....	41
10.4 Thermal Expansion	41
11. Thermal Cycle	41
11.1 Temperature Uniformity	41
11.2 Heating Rate	42
11.3 Hold Temperature and Time	43
11.4 Cooling Rate	43
12. Response to Deviations	44
12.1 Thermocouple Failure.....	44
12.2 Heat Source Failure	44
12.3 Interruption During Heating	44
12.4 Interruption During Hold Period	45
12.5 Interruption During Cooling.....	45
12.6 Excessive Heating or Hold Times During PWHT	46
13. Considerations Related to Service Environment	46
13.1 Appropriateness of Furnace and Local PWHT.....	46
13.2 Exemption from PWHT.....	47
13.3 Tempering and Stress Relaxation Objectives	48
13.4 Hardness Testing.....	48
13.5 Induction Heating Stress Improvement (IHSI).....	49
14. Quality Assurance System	49
14.1 Quality System	49
14.2 Process Control.....	49
14.3 Response to In-Process Deviations.....	50
14.4 Testing.....	50
14.5 Documentation.....	50
14.6 Control of Inspection, Measuring, and Test Equipment	51
14.7 Training.....	51
14.8 Servicing.....	51
15. Induction Heating	51
15.1 General.....	51
15.2 Effect of Composition and Temperature.....	51
15.3 Coil	52
15.4 Ampere Turns	52
15.5 Location of Turns of the Coil	52
15.6 Suggestions for Setup	53
15.7 Relative Advantages and Disadvantages of Induction Heating	53
16. Electric Resistance Heating	54
16.1 General.....	54
16.2 Heaters	54
16.3 Power Sources	55
16.4 Suggestions for Setup	56
16.5 Relative Advantages and Disadvantages of Resistance Heating	56
17. Flame Heating	57
17.1 General.....	57
17.2 Heat Sources	57

17.3 Torch Tip Sizes	57
17.4 Heated Band.....	57
17.5 Flame Adjustment.....	57
17.6 Flame Attitude	57
17.7 Protection from the Elements	57
17.8 Holding	57
17.9 Cooling	57
17.10 Suggestions for Setup	57
17.11 Relative Advantages and Disadvantages of Flame Heating	58
18. Exothermic Heating	58
18.1 General.....	58
18.2 Nature of the Process	58
18.3 Determination of Process Suitability	59
18.4 Suggestions for Setup	59
18.5 Relative Advantages and Disadvantages of Exothermic Heating.....	59
19. Gas-Flame Generated Infrared Heating	60
19.1 General.....	60
19.2 Fundamentals.....	60
19.3 Burner Arrangement.....	60
19.4 Process Control.....	60
19.5 Sheltering of Thermocouples.....	60
19.6 Suggestions for Setup	60
19.7 Relative Advantages and Disadvantages of Gas-Flame Generated Infrared Heating	60
20. Radiant Heating by Quartz Lamps	60
20.1 General.....	60
20.2 Description of the Heating Method	61
20.3 Heater.....	61
20.4 Thermal Cycle Control	63
20.5 Effect of Work Surface Condition	63
20.6 Suggestions for Setup	63
20.7 Relative Advantages and Disadvantages of Quartz Lamp Radiant Heating.....	63
21. Comparison of Heating Processes.....	64
22. Safety and Health	64
22.1 Noise.....	65
22.2 Electrical Hazards.....	65
22.3 Fire and Explosion Protection	65
22.4 Burn Protection.....	66
22.5 Tripping and Falling	66
22.6 Falling Objects.....	67
22.7 Confined Spaces	67
22.8 Electric and Magnetic Fields (EMF)	68
22.9 Lockout/Tagout.....	68
Annex A (Informative)—Discussion of Issues and Recommendations Regarding the Heated Band.....	71
Annex B (Informative)—Discussion of Stresses Induced During Local 360-Degree Band PWHT	75
Annex C (Informative)—Procedure for Thermocouple Attachment by Capacitor Discharge Welding	87
Annex D (Informative)—Accuracy of Thermocouple Temperature Measurements.....	89
Annex E (Informative)—Information on Types of Insulation.....	91
Annex F (Informative)—Standard Procedure for Local Heating	93
Annex G (Informative)—Standard Documentation Checklist for Local Heating	97
Annex H (Informative)—Guidelines for the Preparation of Technical Inquiries.....	99
List of AWS Documents on Piping and Tubing	101

List of Tables

Table	Page No.
1 Comparison of Minimum Preheat/Interpass Heating Soak Band Widths.....	7
2 Comparison of Minimum PWHT Soak Band Widths.....	7
3 Minimum Recommendations for Local 360-Degree Band PWHT of Girth Welds on Piping in the Horizontal Position Based upon B31.1 Minimum PWHT Soak Band Requirements	9
4 Minimum Recommendations for Local 360-Degree Band PWHT of Girth Welds on Piping in the Horizontal Position Based upon B31.3 Minimum PWHT Soak Band Requirements	11
5 Minimum Recommendations for Local 360-Degree Band PWHT of Girth Welds on Piping in the Horizontal Position Based upon ASME Section III Minimum PWHT Soak Band Requirements....	13
6 Comparison of PWHT Axial Temperature Gradient Control Requirements	16
7 Summary of Recommendations for the Soak Band	17
8 Summary of Recommendations for HB, GCB, and Axial Temperature Gradient.....	18
9 Recommended Number of Control Zones and Thermocouple Locations for PWHT of Piping in the Horizontal Position	21
10 Thermocouple Data.....	29
11 Recommended Locations of Monitoring Thermocouples for Local 360-Degree Band PWHT	32
12 Comparison of the Characteristics of Commonly Used Insulation Materials	40
13 Comparison of Maximum Rates of Heating and Cooling During PWHT	42
14 Summary of Key Parameters for Induction Heating Stress Improvement (IHSI)	50
15 Typical Quartz Lamps	62
16 Comparison of Heating Processes.....	64

List of Figures

Figure	Page No.
1 Schematic Diagram for Description of Local 360-Degree Band Heating	5
2 Example of Parameters for Local 360-Degree Band Bake-Out of a Butt Weld in a 12 NPS (300 DN), 1 in. (25 mm) Wall Thickness Pipe	19
3 Example of Parameters for Local 360-Degree Band Preheat/Interpass Heating of a Butt Weld in a 12 NPS (300 DN), 1 in. (25 mm) Wall Thickness Pipe	19
4 Example of Parameters for Local 360-Degree Band Postheating of a Butt Weld in a 12 NPS (300 DN), 1 in. (25 mm) Wall Thickness Pipe	20
5 Example of Parameters for Local 360-Degree Band PWHT of a Butt Weld in a 12 NPS (300 DN), 1 in. (25 mm) Wall Thickness Pipe	20
6 Local 360-Degree Band PWHT Practice for Branch Connection to Pipe Attachment Weld	23
7 Local 360-Degree Band PWHT Practice for Nozzle to Pipe Attachment Weld.....	24
8 Local 360-Degree Band PWHT Practice for Structural Pad/Clip Attachment Weld.....	25
9 Example of One Approach When the Heated Band From a Weld Requiring PWHT Intersects a Weld Not Requiring PWHT	27
10 Schematic Representation of Equipment Used to Directly Attach Thermocouples by Capacitor Discharge Welding	30

Figure		Page No.
11	Schematic Representation of the Direct Attachment, Separated Junction Method for Thermocouple Attachment	31
12	Minimum Number of Thermocouples (Monitoring and Control) Recommended for Local 360-Degree Band PWHT of a Butt Weld for Piping in the Horizontal Position with Pipe Size up to 6 NPS (150 DN) and One Control Zone	33
13	Minimum Number of Thermocouples (Monitoring and Control) Recommended for Local 360-Degree Band PWHT of a Butt Weld for Piping in the Horizontal Position with Pipe Sizes of 8 and up to 12 NPS (200 to 300 DN) and Two Control Zones	34
14	Minimum Number of Thermocouples (Monitoring and Control) Recommended for Local 360-Degree Band PWHT of a Butt Weld for Piping in the Horizontal Position with Pipe Sizes of 20 and up to 30 NPS (500 to 750 DN) and Four Control Zones	35
15	Minimum Number of Monitoring Thermocouples Recommended for a Branch, Nozzle, or Attachment When Heating in Accordance with Figures 6, 7, or 8	36
16	Schematic Depiction of Induction Coil Setup	52
17	Schematic Depiction of Exothermic Heating of Weld Attaching Slip-On Flange to a Well Casing	58
18	Relative Position of Quartz Filament, Reflector, and Workpiece	61
19	“Infrared Furnace” of Quartz Lamp Reflector Units Clam-Shelled or Assembled Around a Pipe	62
B.1	Bending Stress Decay as a Function of βx , Where x is the Distance from the Edge of the Heater to the Centerline of the Weld	76
B.2	Bending Stress Distribution Induced by the Heater Edge, for Heaters of Various Widths	79
B.3	Bending Stress at the Heater Centerline Induced by the Heater Edge, for Heaters of Various Widths	80
B.4	Bending Stress at the Heater Centerline Induced by an Ideal Heater, for Heaters of Various Widths	82

Recommended Practices for Local Heating of Welds in Piping and Tubing

1. Scope

These recommended practices describe several methods of applying controlled heat to weld joints and a limited volume of base metal adjacent to the joints, as opposed to heating the complete weldment in a furnace or oven. This standard makes use of both U.S. Customary Units and the International System of Units (SI). The measurements are not exact equivalents; therefore, each system must be used independently of the other without combining values in any way. U.S. Customary Units are listed first and SI Units are listed second in parentheses () when used in the text.

2. Reference Documents

Extensive reference to local heating requirements found in common piping codes, standards and practices is made to aid the user of this document. These referenced codes, standards and practices are listed below. Except for bake-out and postheating, specific hold temperature and time requirements are not discussed.

2.1 Piping Fabrication Codes

(1) *Power Piping* (ANSI/ASME B31.1), 1995 Edition, with addenda through 1997.

(2) *Process Piping* (ANSI/ASME B31.3), 1996 Edition, with addenda through 1997.

(3) *ASME Boiler and Pressure Vessel Code, Section III, Division 1—Subsection NB, Class 1 Components, Rules for Construction of Nuclear Power Plant Components*, 1998 Edition. (Note: Although direct reference is made to Subsection NB and its related paragraphs, Subsections NC and ND for Class 2 and 3 components have essentially the same requirements.)

(4) *British Standard Specification for Class 1 Arc Welding of Ferritic Steel Pipework for Carrying Fluids*

(BS 2633), 1987 Edition, with Amendments to No. 2, July 1992.

2.2 Repair Codes

(1) *NBIC National Board Inspection Code* (ANSI/NB-23), 1995 Edition, with Addenda through 1996.

(2) *API Piping Inspection Code [Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems]* (ANSI/API 570), June 1993 Edition, with Supplements through #1, January 1995.

2.3 Recommended Practices Regarding Service Environment

(1) *Methods and Controls to Prevent In-Service Environmental Cracking of Carbon Steel Weldments in Corrosive Petroleum Refining Environments* (NACE RP0472-95), 1995.

(2) *Avoiding Environmental Cracking in Amine Units* (ANSI/API 945), 1990.

3. Introduction

These recommended practices consider the various issues associated with local heating of welds in piping and tubing. They specifically address application of controlled heat to the weld metal, heat-affected zone (HAZ), and a limited volume of base metal adjacent to the weld, as opposed to heating the entire component (piping or tubing system) in a furnace or oven. The recommended practices generally address issues associated with circumferential butt welds. As such, primary emphasis is given to considering local 360-degree band heating. However, limited consideration of local spot heating is also provided. Although aimed at local heating, various issues common to both local and furnace heating are also discussed.