

# **Department of Labor and Industry High Pressure Piping**

## **License Examination Guide**

The information in this guide is provided by the Licensing Unit of the Department of Labor and Industry to ensure that applicants for personal high pressure piping licenses administered by the department understand basic qualifications, knowledge areas, examination criteria and format to enable them to successfully complete requirements to become licensed. Although this document contains a significant amount of detail, it should not be construed by applicants to be inclusive of all information necessary to successfully pass a license examination, and subsequently become licensed by the department. It is the applicant's responsibility to adequately prepare to successfully complete the license examination process.

**The Department of Labor & Industry High Pressure Piping and Code for Power Piping Systems became effective May 14<sup>th</sup>, 2018 and along with the codes referenced within it, is the code edition master high pressure pipefitter and journeyworker high pressure pipefitter examinations are based on.**

**The codes have been adopted by reference and made part of the Minnesota High Pressure Piping codes:**

**Code for Steam or Heating Media Piping Systems: ASME B31.1-2016**

**Code for Ammonia Refrigeration Systems: ANSI/IIAR 2-2014, ASME B31.5-2016**

**Code for bioprocess piping: ASME BPE-2016**

**Qualification of welding procedures, welders and welding operators:  
ASME Section IX- 2017**

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# Examination

## Purpose

Successfully completing a license examination provides evidence that the applicant possesses the necessary knowledge and expertise to be licensed in a specific profession or for a specific scope of work within a profession.

Licensing examinations are designed to assess the applicant's competence after they have completed their qualifying education, training, and experience. Licensing examinations are designed to assess higher level skills than academic examinations by assessing the applicant's ability to apply the competencies they gained from their education, training, and experience in actual practice.

Licensing examinations are intended to assure the public that the person passing an examination is qualified to practice within the scope of the license without causing harm to the public.

The purpose of this license examination guide is to provide applicants with awareness of knowledge areas covered by specific license examinations, question and examination format, degree of difficulty for specific license examinations, length of examination, and length of time allowed to complete their examination. Applicants are encouraged to review this entire guide to ensure their understanding of the examination process and governing rules.

## General

1. Examination instructions are intended to be clear, concise, and complete. No questions may be asked of the examination proctor (test administrator).
2. Examination questions and answer selections have been developed to be clear, concise, and complete. Applicants should understand the question without having to read the answer selections. No questions may be asked of the examination proctor (test administrator).
3. Examination questions relate to knowledge areas within the scope of the applicable license.
4. Examination questions reasonably cover the knowledge areas within the scope of the applicable license.
5. Examination questions relate to knowledge areas that are common. The examination knowledge areas are within the areas of work generally experienced by applicants for, or persons holding, the class of the applicable license.
6. Applicants are allowed to use an electronic calculator provided by the Department during their entire examination. No other materials or electronic devices, including cell phones are allowed in the building.
7. Applicants observed giving or receiving assistance from other applicants or outside parties shall be automatically failed and required to submit a new application, including submission of required fees.
8. Applicants observed copying questions or making notes regarding questions shall be automatically failed and required to submit a new application, including submission of required fees.
9. During their examination, applicants may leave the examination room to use the restroom, but are not permitted to leave the building. Applicants leaving the building prior to completing and turning in their examination shall be automatically failed and required to submit a new application, including submission of required fees.
10. In addition to being monitored by the on-site proctor, the examination room may be electronically monitored.
11. Examination materials, including completed examinations and scoring keys are classified as nonpublic by Minnesota Statutes section 13.34. Applicants will only be provided with access to examination materials during the time they are being examined.

## Question Format

1. Examination questions are formatted in a manner that requires the applicant to demonstrate mastery of the knowledge area.
2. Schematic drawings are included as part of each exam, with multiple choice questions asked of each drawing.
3. Variables in a question ensure that the appropriate knowledge area(s) or code rule(s) must be applied to arrive at the correct answer.
4. Multiple-choice answer selections for knowledge areas with multiple conditions or requirements are worded in a manner that requires the applicant to demonstrate knowledge of the subject matter and minimize the applicant's opportunity to select a correct answer(s) based on key words.
5. Questions requiring more than one multiple-choice answer selection are clearly identified, including the number of correct answer selections. This is a companion format to the negative-response format identified in 6 below.
6. Questions with a negative-response format such as "which of the following does **not** apply," are only used in limited instances. This is a companion format to the multiple-correct answer format identified in 5 above.
7. Negative response questions and questions requiring more than one multiple-choice answer are limited to: a list of conditions, a list of requirements, or a list of methods.
8. Incorrect multiple-choice answer selections are "plausible."
9. Questions may include extraneous information.
10. As many as 5 variations of an examination may be administered on the same examination date.
11. Individual examinations are modified not less than three times each High Pressure Piping code cycle.
12. Examination questions and suggestions are accepted on an on-going basis from interested parties and become part of an examination question database from which examinations are created.
13. Some questions relate to code violations repeatedly made by license holders. Practical experience must be augmented by quality training to ensure the applicant's complete and accurate understanding of the subject matter.

## Degree of Difficulty

1. Each examination question is assigned a degree of difficulty rating from 1 to 5, with 5 being the most difficult. "Degree of difficulty" as used in administration of the department's license examinations has no relationship to academic "grade point average" achievement.
2. Questions rated least difficult (lowest) are those that relate to a single knowledge area, such as definitions or those requiring the application of a single code rule, or do not require complex mathematical calculations.
3. Questions rated most difficult (highest) are those that require the application of multiple code rules or require multiple or complex mathematical calculations.
4. Each examination is assigned a degree of difficulty range that is commensurate with the responsibility or authority of the applicable license.
5. Approximately 50% of specific license examination questions have a degree of difficulty within the overall "degree of difficulty" range for the license type.
6. The examination for those license types that allow the holder of the license to be the "responsible licensed person" for a contractor have an average degree of difficulty range between 2.5 to 3.5. This category includes master high pressure pipefitter.
7. The examination for those license types that require the license holder to be provided with general supervision by a person holding a license type identified in 6 above have an average degree of difficulty range between 1.5 to 2.5. These license types include journeyworker high pressure pipefitter.
8. Examination questions are structured to use words and phrases appropriate to the license, without using non code and theory terms that would unnecessarily increase the degree of difficulty.

## Length of Examination

1. The license examinations for the master high pressure pipefitter consist of 100 questions.
2. The license examination for the journeyworker high pressure pipefitter consists of 100 questions.
3. Unless stated otherwise, all examination questions have the same point value. Partial points are not given - either full point credit or zero point credit is awarded for each question.
4. The passing score for all examinations is 70 percent.
5. The time allowed to complete all examinations is 5 1/2 hours.

## Examination Results

1. Examination results are mailed to applicants within two weeks of the examination. Examination results are not provided to applicants by telephone or e-mail.
2. Examination result letters mailed to applicants who passed their examinations will contain directions on how to obtain their license.
3. Examination result letters mailed to applicants who failed their examinations will contain directions on how to make subsequent application.

## Examination Review or Appeal

1. Examinations with scores within five (5) percentage points of passing are rechecked to ensure accuracy.
2. Written or oral reviews of individual examinations are not available to applicants. Applicants may provide written comment to the Department's licensing unit on specific examination questions.
3. Applicants who fail any examination are prohibited from retaking the same or greater class of license examination for a period of not less than 30 days.

# Sample Questions

The sample questions are intended to identify the various question formats that are used in the examinations. The knowledge areas used in the sample questions may not be applicable to all classes of examination.

1. It is mandatory that a \_\_\_\_ be installed on the low-pressure side of a reducing valve in a high pressure steam system.  
  
A. stop valve  
B. safety relief valve  
C. pressure gauge  
D. strainer

**Answer: C MN Rules Chapter 5230.0285 subp. 2**

Question demonstrates "common" multiple-choice question format.

2. What is the maximum span between supports on a 12" ammonia refrigeration suction line?  
  
A. 16'  
B. 19'  
C. 23'  
D. 28'

**Answer: C IIAR 2-2014 Appendix F**

Question demonstrates "common" multiple-choice question format.

3. Which of the following **is not** a welding process used in the construction or installation of high pressure piping systems?
- A. GMAW
  - B. SMAW
  - C. GTAW
  - D. STAW

**Answer: D ASME Section IX QW-252 to QW-265**

Question demonstrates “negative-response” multiple-choice question format.

4. A 6” diameter, 250’ long carbon steel steam line is installed at 74 degrees F and will operate at 319 degrees F. How much will this line expand during operation?
- A. 3.25”
  - B. 4.16”
  - C. 4.92”
  - D. 5.76”

**Answer: C General Knowledge, several sources**

Question demonstrates “common” multiple-choice format.

5. What is the end to center takeoff measurement for a 4” long radius 45 degree elbow?
- A. 2.25”
  - B. 2.5”
  - C. 3”
  - D. 3.5”

**Answer: B General Knowledge, several sources**

Question demonstrates “common” multiple-choice format.

# Formulas and Sample Calculations

The following information includes brief explanation and example of basic formulas and calculations used in the field of high pressure piping and is **not** intended to be inclusive of all formulas and calculations applicants need to be familiar with to successfully perform high pressure piping work or receive a passing score on any license examination administered by the Department. Examples of more complex calculations can be found in other resources. Knowledge gained through practical experience is generally not adequate to enable an applicant to pass a licensing examination. It is the responsibility of an applicant to adequately prepare themselves, either through formal training or informal, self-help training.

## Units of Measurement

Because most applicants are more familiar with the inch-pound units, all questions and answers in department license examinations use the inch-pound unit system.

## Percentages

A percentage is defined as a ratio of a whole number to 100. The number value, including any decimal of this ratio, is multiplied by 100 and assigned the % sign.

Sample Percentage Questions:

### What is 70% of 140?

The percentage amount is divided by 100 to obtain the decimal equivalent. ( $70 \div 100 = .70$ )  
140 is multiplied by .70 ( $140 \times .70 = 98$ )

**Answer: 70% of 140 = 98**

### What is the result of increasing 120 by 25%?

The percentage amount is divided by 100 ( $25 \div 100 = .25$ )  
120 is multiplied by .25 ( $120 \times .25 = 30$ )  
30 is then added to the original value of 120 ( $30 + 120 = 150$ )

**Answer: 120 x 1.25 = 150**

## Formulas

Linear expansion of piping:

E= expansion in inches per 100 feet of pipe

F= starting temperature

T= final temperature

Constants per 100 feet:

Carbon Steel: .00804

Cast Iron: .00780

Copper: .01140

$E = \text{constant} \times (T - F)$

To calculate the temperature of saturated steam: square root of gauge pressure x 14 + 198



# Examination Knowledge Areas

The following table generally identifies knowledge areas included in examinations by license type.

Knowledge areas are based on MN Statutes Chapter 326B.90-326B.925, MN Rules Chapter 5230, and the code standards adopted within.	Class of License					
	HM	HJ				
Personal licensing requirements	X	X				
Contractor license requirements	X					
Permit calculation & requirements	X					
Unlicensed pipefitter registration & apprentice requirements	X					
General piping measurement/offset calculations		X				
General mathematic equations	X	X				
Pipefitting formulas	X	X				
Steam system knowledge	X	X				
ASME B31.1-2007 steam piping	X	X				
Welding requirements for high pressure steam systems	X	X				
Piping support requirements	X	X				
Ammonia refrigeration system knowledge	X	X				
IIAR 2-2008 ammonia refrigeration systems	X	X				
Welding requirements for ammonia refrigeration systems	X	X				
Piping support requirements	X	X				
General welding terminology	X	X				
ASME Section IX contractor requirements	X					
Welding documentation/records	X					

## **A BRIEF SUMMARY OF YOUR RIGHTS UNDER THE**

### **AMERICANS WITH DISABILITIES ACT**

#### **INTRODUCTION**

The Americans with Disabilities Act (“ADA”) covers “public entities.” The Department of Labor and Industry (Department) is a “public entity” covered by the ADA. The Department may not refuse to allow a person with a disability to take the examination simply because the person has a disability. It must permit persons with disabilities to take the examination in an integrated setting unless separate or different measures are necessary to ensure equal opportunity. It must eliminate unnecessary eligibility standards or rules that deny individuals with disabilities an equal opportunity to take the examination.

#### **WHO IS COVERED?**

The ADA provides comprehensive civil rights protection for “qualified individuals with disabilities.” An “individual with a disability” is a person who: 1) has a physical or mental impairment that substantially limits a “major life activity,” 2) has a record of such an impairment, or 3) is regarded as having such a impairment. “Major life activities” include functions such as caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working. Individuals who currently engage in the illegal use of drugs are not protected by the ADA when an action is taken on the basis of their current illegal use of drugs.

A “qualified” individual with a disability is one who meets the essential eligibility requirements for the examination. The Department is not required to take any action that would result in a fundamental alteration in the nature of the examination or an undue financial and administrative burden. However, the Department must take any other action, if available, that would not result in a fundamental alteration or undue burdens but would ensure that individuals with disabilities receive the benefits or services.

#### **WHAT IS REQUIRED?**

The Department is required to make reasonable modifications in any policies, practices, and procedures that deny equal access to individuals with disabilities, unless a fundamental alteration in the examination would result. To do so, it must furnish auxiliary aids and services when necessary to ensure effective communication, unless an undue burden or fundamental alteration would result. The Department may not place special charges on individuals with disabilities to cover the costs of measures necessary to ensure nondiscriminatory treatment, such as making modifications required to provide program accessibility or providing qualified interpreters. Finally, it must operate the examination so that, when viewed in its entirety, it is readily accessible to and usable by individuals with disabilities.

Integration of individuals with disabilities into the mainstream of society is fundamental to the purposes of the ADA. The Department may not provide the examination to individuals with disabilities through programs that are separate or different, unless the separate programs are necessary to ensure that the benefits and services are equally effective. Even when separate programs are permitted, an individual with a disability still has the right to choose to participate in the regular program. The Department cannot require an individual with a disability to accept a special accommodation or benefit if the individual chooses not to accept it.

#### **QUESTIONS?**

If you have any questions about the ADA we encourage you to call the United States Department of Justice which has an ADA information line, at (202) 514-0301 (voice) or (202) 514-0381/0383 (TTY). These telephone numbers are not toll-free numbers.

**INFORMATION ABOUT THE EXAMINATIONS AND AVAILABILITY OF ALTERNATIVE  
ARRANGEMENTS FOR PERSONS WITH DISABILITIES**

**GENERAL INFORMATION**

If you are a person with a disability, you have certain rights under the Americans with Disabilities Act (“ADA”). A brief summary of these rights is on the back of this sheet. It is not meant to be complete. If you have any questions about your rights under the ADA we encourage you to call the United States Department of Justice, which has an ADA Information Line, at (202) 514-0301 (voice) or (202) 514-0381/0383 (TTY). These telephone numbers are not toll-free numbers.

**ABOUT THE EXAMINATIONS**

A copy of the License Examination Guide may be obtained from the Department’s website at: <http://www.dli.mn.gov/cclD/PDF/LicensingExaminationGuide.pdf>  
Examinations are held weekly, generally every Wednesday, at the Department of Labor and Industry Building located at 443 Lafayette Road North, Saint Paul, just north of the intersection of Interstate 94 and US Highway 52 (Lafayette Road North), on the northeast edge of downtown Saint Paul. The building is accessible to persons with physical disabilities.  
Specify instructions for scheduling and appearing for an examination are included in the letter that is sent to approved applicants.

**ALTERNATIVE ARRANGEMENTS**

The ADA requires this agency to make “reasonable accommodations” for applicants with disabilities in giving the examinations. If you are a person with a disability which may affect your ability to enter the examination facility or to take any portion of the examination, the ADA may require the agency to provide alternative examination arrangements. We are not required to do so if we are unaware of your need for alternatives. Based on the above description of the examination facilities and the examination itself, we ask that you inform us of any alternative arrangements you may require to take and examination. Please describe in detail:

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(Use additional paper if necessary and attach to this form)

**SIGNATURE** \_\_\_\_\_ **DATE** \_\_\_\_\_

**IF YOU ARE REQUESTING ALTERNATIVE ARRANGEMENTS BASED ON A DISABILITY,  
PLEASE SUBMIT THIS FORM WITH YOUR APPLICATION FOR EXAMINATION FORM.**

# Examination Schedule/Scheduling Examinations

**Before anyone may schedule an examination date, the individual's examination application must be approved by DLI. There are no exceptions.**

Dates scheduled by individuals without written approval of their application will be rejected and not scheduled. Individuals retesting after a failed exam must apply for another examination date.

Detailed exam dates, location and scheduling information can be accessed at:  
[http://www.doli.state.mn.us/CCLD/exam\\_schedule.asp](http://www.doli.state.mn.us/CCLD/exam_schedule.asp)

Applicants must schedule their examinations ahead of time. Walk-ins are not permitted to take an examination. Applicants may reschedule their examination one time. Applicants that fail to appear for a rescheduled examination as well as applicants that fail their examination must submit a new application and examination fee before being approved for examination or reexamination.

**All examination types administered at the St. Paul office begin at 8:15 a.m. and end at 1:45 p.m. All examination types are allotted 5½ hours for completion. All applicants should arrive at the examination site not later than 30 minutes before their scheduled starting time. A picture ID must be presented by all applicants when they appear for examination.**

**Note: Food and drink are permitted during the exam.**

The Department of Labor and Industry Building located at 443 Lafayette Road North, Saint Paul, just north of the intersection of Interstate 94 and US Highway 52 (Lafayette Road North), on the northeast edge of downtown Saint Paul.

<http://www.mapquest.com/maps/map.adp?country=US&addtohistory=&formtype=address&searchtype=address&cat=&address=443%20Lafayette%20Rd%20N&city=Saint%20Paul&state=MN&zipcode=55155%2d4301>

Specific instructions concerning the examinations in St. Paul are sent as a part of the "Approved for Examination" letter and specific instructions for out-state sites are sent to persons who schedule at those sites.

# Qualifications for License Applicants

## **Military Experience**

Applicants may receive experience credit for performing work in the military. Applicants with military experience should include a copy of their DD214 discharge documents with their application.

## **Practical Experience/Experience Requirements By License Type**

Minnesota Rule 5230.0070-5230.0080 identifies allowable experience credit, situations under which experience is acceptable to the Department, and experience requirements for all license categories. Applicants are encouraged to review these requirements prior to submitting an application. Application/examination fees for applicants that do not qualify for examination are not refundable.

Minnesota Rule 5230.0070-5230.0080 can be accessed at:  
<https://www.revisor.mn.gov/rules/?id=5230&format=pdf>

## **Obtaining Licenses Through Reciprocal Agreements**

Minnesota currently has no established reciprocal licensing agreements with any other states under high pressure piping licensing.

# Personal License and Examination Application

Personal license applications are included in the hard-copy packet or may be downloaded from the Department's website at: <http://www.doli.state.mn.us/CCLD/HPPForms.asp>

**Upon request this document can be made available in alternative formats for people with disabilities.**