

RECLAMATION

Managing Water in the West

Design Standards No. 6

Hydraulic and Mechanical Equipment

Chapter 16: Machine Shop Equipment
Phase 4 (Final)



Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Design Standards Signature Sheet

Design Standards No. 6

Hydraulic and Mechanical Equipment

**DS-6(16): Phase 4 (Final)
December 2016**

Chapter 16: Machine Shop Equipment

Foreword

Purpose

The Bureau of Reclamation (Reclamation) design standards present technical requirements and processes to enable design professionals to prepare design documents and reports necessary to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Compliance with these design standards assists in the development and improvement of Reclamation facilities in a way that protects the public's health, safety, and welfare; recognizes needs of all stakeholders; and achieves lasting value and functionality necessary for Reclamation facilities. Responsible designers accomplish this goal through compliance with these design standards and all other applicable technical codes, as well as incorporation of the stakeholders' vision and values, that are then reflected in the constructed facilities.

Application of Design Standards

Reclamation design activities, whether performed by Reclamation or by a non-Reclamation entity, must be performed in accordance with established Reclamation design criteria and standards, and approved national design standards, if applicable. Exceptions to this requirement shall be in accordance with provisions of *Reclamation Manual Policy*, Performing Design and Construction Activities, FAC P03.

In addition to these design standards, designers shall integrate sound engineering judgment, applicable national codes and design standards, site-specific technical considerations, and project-specific considerations to ensure suitable designs are produced that protect the public's investment and safety. Designers shall use the most current edition of national codes and design standards consistent with Reclamation design standards. Reclamation design standards may include exceptions to requirements of national codes and design standards.

Proposed Revisions

Reclamation designers should inform the Technical Service Center (TSC), via Reclamation's Design Standards Website notification procedure, of any recommended updates or changes to Reclamation design standards to meet current and/or improved design practices.

**Chapter Signature Sheet
Bureau of Reclamation
Technical Service Center**

Design Standards No. 6

Hydraulic and Mechanical Equipment

Chapter 16: Machine Shop Equipment

**DS-6(16): Phase 4 (Final)
December 2016**

Chapter 16 – Machine Shop Equipment is a new chapter within Design Standards No. 6 and includes a description of:

- Necessary machine shop equipment, including selection, listing, and purchase
- Machine shop layout
- Coordination of electrical demands

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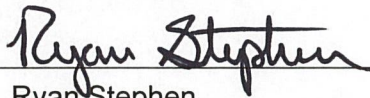
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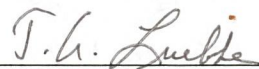


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Chapter 16

Machine Shop Equipment

16.1 Equipment for Machine Shop

The types of equipment required for a machine shop are initially determined on the basis of the overall plant requirements. On the other hand, a thorough analysis must be made to determine what type of machine shop facilities will be necessary for a new construction project. The machine shop will be used to perform necessary equipment repair and maintenance. In view of this, consideration must be given to the degree to which the machinery and its parts will be subjected to wear, as well as the type and amount of repair and maintenance work that will be required. In addition, a determination must be made as to the dimensions and weights of the machine parts to be shop worked.

16.2 Selection of Equipment

To plan and select the proper equipment required for the shop facilities, the following determinations must be made:

1. The various machine tools that will be necessary to perform the required work on machinery parts to be repaired and maintained, with due consideration to commercial shop services available in the vicinity.
2. The floor area required to operate the selected shop machine tools, as well as a sufficient amount of space for the assembly floor, the tool room, and storage.
3. The capacity, type, and head room required for a crane or other equipment suitable for handling the machinery parts in the shop.

16.3 Typical Items of Equipment

In general, machine shop facilities are equipped with some or all of the following machine tools, depending on the requirements:

Lathes	Pedestal and bench	Electric welding machines
Milling machines	grinders	Gas cutting and welding
Radial drills	Hydraulic presses	equipment
Drill presses	Arbor presses	Metal-spraying equipment
Shapers	Power saws	Woodworking equipment

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Boring mills	Bolt threading machines	Sheet metal working equipment
Planers	Pipe cutting and threading machines	Miscellaneous small tools
Tool and cutter grinders	Welding fume extractors	

16.4 Listing and Purchasing Shop Equipment

After shop requirements have been determined, lists of required shop machine tools, along with their size and work capacity requirements, are prepared. These lists will be used in the specifications required for purchasing. The design division prepares drawings that show the complete installation, and these drawings are sent to the appropriate field office.

After bids have been received, the equipment offered by the low bidder is checked for conformity with the requirements of the specifications.

16.5 Layout of Shop

Shop layouts should include working areas and handling facilities. They should provide a compact, efficient shop arrangement. Shop tools should be arranged efficiently and placed at a location where maintenance and repair work will likely require their use. When determining the placement of particular work operations, consideration should be given to the space allowance required to perform the work, and clearances required to bring machine parts into the shop for maintenance and repair work. In addition, the tool room, material storage, locker room, and restroom facilities should be placed at a convenient location. Machine tools should be located in areas with good lighting. In addition, welding, burning, and grinding operations, as well as forge and smithing work, should be segregated away from the machine and assembly work areas.

16.6 Coordination of Electrical Demands

Ensure that the electrical designer is informed of all electrical loads and locations of equipment. Many of the smaller hand tools will require distributed outlets at convenient locations to eliminate the use of extension cords. Larger equipment will require dedicated circuits with local disconnects. Depending on the equipment that is selected, the machine shop could add significant load to the overall plant station service power requirements.