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**Federal Wage System  
Job Grading Standards**



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**FEDERAL WAGE SYSTEM  
JOB GRADING  
STANDARD  
FOR  
PATTERNMAKING,  
4616**



**Workforce Compensation  
and Performance Service**



# PATTERNMAKING, 4616

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## WORK COVERED

This standard covers nonsupervisory work which involves planning, laying out, and constructing patterns and core boxes used in forming molds for castings of ferrous and nonferrous metals and other substances. The patterns and core boxes are made from a variety of materials such as wood, wood products, and wood substitutes.

## WORK NOT COVERED

The following kinds of work are not covered by this standard:

- Operating machine tools on rough metal castings for use as metal patterns or core boxes;
- Making scale and full size wooden prototype models for use in research and development tests and experiments.

## TITLES

Jobs graded by this standard are to be titled *Patternmaker*.

## GRADE LEVELS

This standard describes only one grade level for this occupation. However, some jobs may differ substantially from the skill, knowledge and other work requirements described at this grade level. These jobs may warrant grading either above or below the grade level which is described.

**4616-14****PATTERNMAKER, GRADE 14****4616-14**

*General:* Grade 14 patternmakers plan, lay out, and perform machine operations and benchwork to construct, alter, and repair three-dimensional patterns and core boxes with unusual contours and a variety of irregular shapes and interrelated dimensions. They assume responsibility for the quality of workmanship, the accuracy of contours and dimensions, and the construction processes from initial assignment to the completion of the project. They coordinate with foundry workers and machinists on unusual problems which will complicate the casting or machining processes. A shop supervisor establishes priorities, but the Grade 14 patternmakers organize their work methods according to their own plan.

*Skill and Knowledge:* Grade 14 patternmakers must know how to plan and lay out complex patterns from reading and interpreting two-dimensional scale drawings of items to be cast in the foundry and by adapting them to resolve problems involved in developing three-dimensional or isometric drawings of the pattern. They use a knowledge of shop mathematics, plane and solid geometry to calculate size and dimensional relationships and to reproduce the full-scale design of the pattern. They must know how to plan the work sequences so that other patternmakers can easily follow the instructions and work processes.

Based on a knowledge of foundry practices, they must know the amount of shrinkage for ferrous, nonferrous metals, or the alloy which will be poured. They determine the method of molding and visualize the kind of core boxes to be used and the type, shape, and number which will be needed to complete the item. When making master patterns from which metal patterns are to be cast, They must know how to allow for the double shrinkage of cooling metals. They must visualize and plan for the type of pattern or core box (solid, tapered, split, cylindrical, any combination) which will be the most efficient and economical. Using a knowledge of the characteristics of various kinds of woods, plastics, waxes, plasters and plastic compositions, They determine and select the materials to be used. They conceive, and make special jigs, fixtures, templates, guides, and gages to facilitate the manufacture and assembly of complex shapes of components to very close tolerances. They must know how to allow for machining on the final product; the size, number, and placement of core prints; the proper draft allowance and the proper size and placement of gates, runners, and spruces.

Grade 14 patternmakers must know which woodstock, wood product, or substitute will be the most effective and economical for the pattern and for the best resistance to warping or bending. They must know how to construct pattern shapes using a variety of techniques such as stave, segment, or laminated methods of construction. They must know how to make and where to place wax, leather, or wood fillets so there is no sudden change in direction of the flow of molten metal which will result in sudden cooling or excess shrinkage. They must know how and where to glue, nail, screw, dowel, or pin pieces together so that complete assemblies fit precisely and can be easily assembled and disassembled. They must know how to smooth the pattern to exact dimensions; paint or mark identification symbols for quick and easy assembly; and to shellac or finish the pieces to achieve hard finishes.

**4616-14****4616-14**

Grade 14 patternmakers must have skill in marking and measuring patterns, using tools such as scribes, dividers, protractors, gages, trammels, templates, shrinkage rules, and squares. They must have the skill to cut, shape, form, and finish the patterns by setting up and operating a variety of precision tools such as band, table, and radial arm power saws, lathes, sanders, borers, routers, jointers, shapers, and milling machines. They also hand finish the patterns, using hand tools such as files, gages, chisels, drawknives, and filleting and cornering tools.

*Responsibility:* Grade 14 patternmakers plan their own work procedures and select their own material. They are responsible to their supervisor for the contour and dimensional accuracy of the pattern and for independently following an assignment through to completion. They determine how the work is to be done, the number and sequence of steps needed to do the work, and the number, size, and shapes which are needed to cast the completed object and how many of what kind of pieces are needed.

Grade 14 patternmakers must visualize the item to be cast and they must plan and construct the pattern which will produce the desired casting. They discuss projects with foundry and machine shop personnel and their supervisor to determine if peculiar problems exist which may be eliminated by special treatment of the pattern and to offer recommendations concerning strengthening, reinforcing, and the production molding methods.

Completed work is checked by a supervisor to see that the project meets the required specifications and accepted trade standards. Judgments and decisions which are made during the planning stage will affect the type, nature, cost, and size of the pattern as well as the dimensions, strength, and shape of the item to be manufactured.

*Physical Effort:* Physical effort is used to frequently lift and carry woodstock by hand of approximately 18 kilograms (40 pounds). Hoists, handtrucks, lifts, and other workers are available for assistance with heavier material. The work requires prolonged standing, bending, stooping, and reaching.

*Working Conditions:* Patternmakers usually work in a shop where there is dust, dirt, and fumes, danger to the skin and eyes from chips and to fingers and hands from close contact with sharp edges, moving cutters, and sanding wheels. They are subject to loud noises, heat and glare from open fires, and hot metal during occasional visits to the foundry.