RESTRICTED

STANDARD INSPECTION PROCEDURE for Wood Bodies

ORD-SIP-E4

For Guidance of Ordnance Inspection Personnel

Prepared by

Inspection Section, Engineering-Manufacturing Branch
Office of the Chief of Ordnance — Detroit

Detroit 32, Michigan

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AUTHORITY

Prepared under the direction of Inspection Section Eng-Mfg Branch O.C.O. Detroit in accordance with Authority of O.P.I. 50,003 and 56,216.1.

Foreword

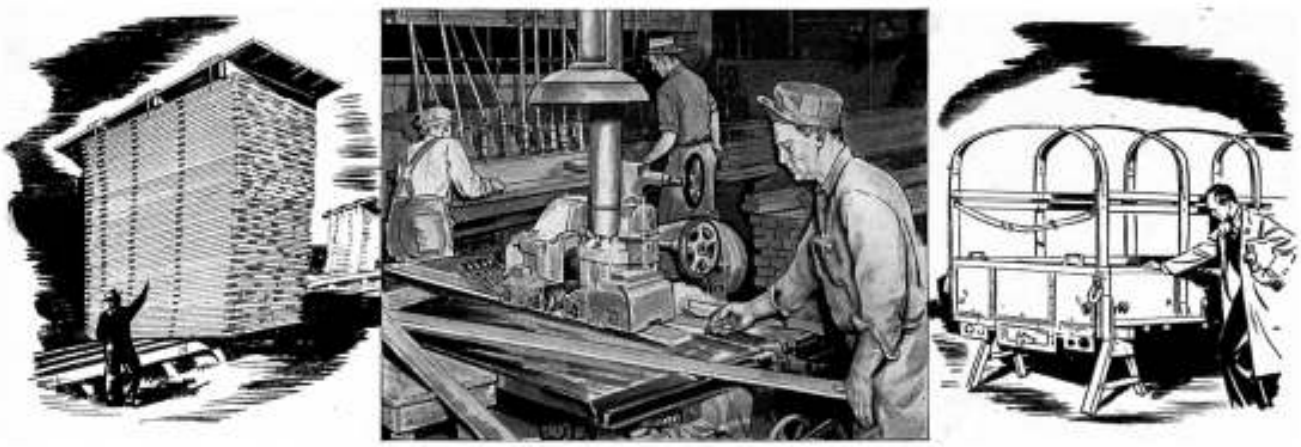
Standard Inspection Procedure for Wood Bodies has been prepared primarily for Ordnance Inspectors who are new to the methods and techniques of wood and wood body inspection. However, inspectors of wide experience should find much of the data beneficial for reference and it will tend to unify standards and inspection methods.

This writing deals with the basic elements of the problems confronting the inspectors of wood bodies but of necessity cannot include all the technical matter involved in wood fabrication. It must be borne in mind that minor changes in standards and requirements may be introduced from time to time, therefore specific details will be found in the applicable drawings and specifications, and instructions contained in this book will deal with the fundamentals of wood inspection.

Quality in workmanship and material is essential. Always remember that a transport vehicle carrying military supplies or personnel is as important to victory as combat equipment and if the body fails on a transport vehicle the vehicle is out of action.

Wood body inspection has three important phases, *first*, the inspection of the wood itself, *second*, inspection of manufacturing process, and *third* inspection of the end product. Knowledge of different woods is essential before an inspector can adequately pass on the material and it is equally important that the inspector be able to detect defects in wood as well as in workmanship.

This book gives the inspectors the essential general information on wood and sets forth the important inspection points.



Office* • CHIEF OF ORDNANCE • *Detroit

Engineering-Manufacturing Branch, Inspection Section

ARMY SERVICE FORCES

IN REPLY REFER TO: OFFICE OF THE CHIEF OF ORDNANCE—DETROIT CHERRY 4900

DETROIT 32, MICHIGAN

O. O. M.

ATTENTION

Gitzendanner/jj
2264 - 31st Fl.

SPOME-I

1 March 1944

INSPECTION MEMORANDUM
NO. 23A

Subject: Inspection Policy - Office, Chief of Ordnance - Detroit.

1. This is being published so that the Districts may have in one place a single statement of the general policy of the Inspection Section, Engineering-Manufacturing Branch, OCO-D. It includes such changes to Inspection Memorandum No. 23 as changing conditions indicate to be desirable.

a. All Ordnance personnel must believe that industry wants to do a good job and that when it fails, it is the fault of the Ordnance Department in not getting our ideals over. To this end, Inspection instructions, policies, techniques and handbooks will be made uniform by OCO-D, based on the best thinking of all Districts, Key Inspectors and industry. In order to insure prompt development of uniform practices, the Districts should transmit these promptly and not attempt to interpret, re-edit or reissue. So far as possible, industry should be encouraged to use our standards so that they know what is required of them. Results of Inspection Control Testing at Proving Grounds (see Inspection Memorandum No. 8A) will be sent to the District and Resident Inspector involved and should be discussed with the facility management and inspection.

b. OCO-D Inspection Section personnel and the ODIIC Key Inspectors will issue appropriate instructions only through the Districts and not direct to facility.

c. Close collaboration and mutual esteem should be the relationship of the Ordnance Inspector to facility inspection. It is the job of Ordnance inspection to inspect the facilities' inspection and not to duplicate it. Manufacturers want to take over all but final inspection. This is desirable if and when they prove by results that they can achieve a proper quality level. Frankness with manufacturer's chief inspector and management will get results. To this end, it is suggested that the Districts adopt the long-established commercial practice of arranging to have name stamps for both inspectors placed on vehicles to develop pride and responsibility.

d. Drawings and specifications must be adhered to except when Deviation Permits or permission to use sub-standard material has been granted by OCO-D (see Inspection Memorandum No. 48 and Engineering Bulletin No. 51A). It is admitted, however, that judgment frequently is required as to what material actually conforms to specification requirements, but judgment sometimes is confused with imagination. To assist in interpreting the extent to which judgment in inspection should be applied in connection with tolerances and dimensions, the following basis is suggested.

(1) Critical - any dimensions for which no subsequent check is available, and which, if not held within tolerances, may cause failure resulting in injury to our troops or serious damage to the equipment.

(2) Major - any dimensions for which no subsequent check is available, and which, if not held within tolerances, may cause

malfunctions as would result in failure of the equipment to perform its intended mission.

(3) Minor - all other dimensions not falling in (1) or (2) above.

e. Source inspection should be conducted only far enough back to insure that the best interests of the Government are served. At those plants making major sub-assemblies, such as engines, transmissions, axles, generators, starters, regulators, batteries, clutches, tires, fire extinguishing equipment, rubber products and the like where large quantities of the material are used in the Ordnance vehicle program, even though the design is under the control of the manufacturer, it is in the best interest of the Government that Ordnance inspectors be assigned to the plant. In such instances, it is desirable that material from the plant going to all destinations be source inspected. Regardless of Ordnance source inspection, the final assembler has the final responsibility. "Commercial items" and those stamped with the "flaming bomb" should be sample-tested occasionally to insure that quality has not lowered. When defective Ordnance source-inspected material is received, action as outlined in Industrial Division Order No. 30 and T-AC Bulletin No. 22 should be taken promptly.

f. Ordnance Districts which contract for materials being produced in other Districts must operate through the latter Districts and not direct with the facilities. All inspectors should set up means of determining whether a facility ships to another facility material which he has rejected, and when he believes that rejected material is being shipped to Ordnance facilities for improper use, he will notify his District promptly so that proper warning may be passed on to another Resident Inspector or to another District. Only in this way can our quality standards be made uniform.

g. Too great emphasis cannot be placed upon the need for proper packaging and shipping of spare parts. Principles governing this important work are outlined in Ordnance Department Order No. 70, Rev. 1, 29 July 43.

h. The rapidly expanding remanufacturing program of the Ordnance Department will present inspection problems quite different from those encountered in the inspection of newly manufactured equipment, and serious attention by the Districts is warranted. The principles governing the inspection of remanufactured vehicles are outlined in Inspection Memorandum No. 56.

i. Inspectors must have available all applicable contracts, drawings and specifications.

j. Districts are urged to prepare manuals of operating procedures covering their particular local conditions for the guidance of inspectors. Some Districts have prepared such manuals and their value has been amply demonstrated. When in such manuals there arise occasions to describe procedures resulting from directives from higher authority, such as Ordnance Department Orders, Ordnance Department Bulletins, Industrial Division Orders and the like, these basic references should, if pertinent, be quoted or at any rate be referred to as a means of identifying, particularly to other Districts, the procedure involved.

k. Quality Control methods (mathematical probability sampling) should be applied to inspection of any item produced under such conditions as to make results of such inspection valid.

l. The Inspection Section wants to cooperate with the Districts and the Key Inspectors. By cooperation we understand that it means to do our work in such a way as to help you do yours.

2. Let's get on with the War.

By Order of the Chief of Ordnance:

F. A. GITZENDANNER
Major, Ordnance Dept.
Assistant

INSPECTION FUNDAMENTALS

Authority of the Resident Inspector of Ordnance is established by the fact that he is the accredited representative of the Chief of an Ordnance District whose responsibilities as set forth in O. P. I. 50,003 include ". . . the Chief of an Ordance District . . . is responsible for determining that each article made or repaired, and all other work performed, complies, when accepted, with the drawings, specifications and other requirements. . . ."

INSPECTION STANDARDS must be uniformly high, making sure that the requirements of the drawings and specification have been complied with. The Ordnance Inspector is the guardian of quality and it is his job that calls for accuracy, efficiency, sincerity of purpose and personal conduct that will command respect. In all dealings with a manufacturer's personnel, the Inspector must have facts and good reasoning to support any stand he may take. He should respect and carefully consider the manufacturer's opinion before acting. Manufacturers are sincere in their effort to turn out good material. The human element, however, sometimes presents problems, and constructive suggestions are often necessary. Discuss any such situation with your immediate superior, should it be of sufficient importance and then present your suggestion with fairness and tact to the manufacturer.

The proper attitude toward the people you work with is just as important as a careful bench inspection or the final acceptance of the finished product. You are dealing with PEOPLE as well as PARTS.

The **Contract, Drawings** and **Specifications** set forth the conditions that must be met by the contractor and they constitute the basis of the inspector's judgment when accepting material.

The following modifications when properly authorized, become part of the contract: **An Engineering Release** is issued when a new item is to be made part of the product. **An Engineering Change** notice is issued to make a change in an item of the product. **A Deviation Permit** is issued when it is found necessary to allow a substitution of material or to facilitate the manufacture of a part. Should any conflict exist between the contract, drawings or applicable specifications the order of precedence will be:

1—Contract, including modifications thereof.
2—Drawings.
3—Detail Specifications for the item being produced.
4—General Specifications for the class of items.
5—Detail specifications for materials or operations.
6—General specifications pertaining to classes of materials.

KEY INSPECTORS function under the direction of the Ordnance Department representative assigned to the Ordnance Department Industry Integrating Committee (O. D. I. I. C.) of a particular industry that is engaged in producing Ordnance items. In general the Key Inspector's duties are as follows:

a. To integrate inspection policies and promote the effective use of Standardized Inspection Procedures.
b. To standardize interpretation of applicable drawings and specifications.
c. To recommend revisions and improvements in inspection procedures.
d. To anticipate possible production failures and report them to the Officer-in-Charge of the particular O. D. I. I. C. committee involved.
e. To keep abreast of developments on material as it affects inspection procedures.

f. By means of discussions, to mutually educate all inspectors to obtain better quality and improve the efficiency of inspection.

g. To keep the Inspection Section, Engineering-Manufacturing Branch O. C.O.—Detroit, informed of actions and developments encountered in the course of his duties.

Resident Inspectors of Ordnance will cooperate with the Key Inspector in the accomplishment of his mission and discuss any problem concerning the product that falls within the scope of the Integrating Committee.

PROCESS INSPECTION is generally held to the minimum inasmuch as Ordnance Inspection is usually focused on the end product, however, in the fabrication of wood bodies many process requirements are contained in the specifications and it is the responsibility of the inspector to ascertain that they are complied with. Process inspection is particularly important in wood fabrication because neglect on the part of the manufacturer to meet the process requirements frequently cannot be readily detected in the end product at the time of acceptance. This is particularly true when moisture content of wood is not controlled and gluing procedures are not processed according to specification. Failure to properly perform these operations seriously affects the life of a vehicle body, due to subsequent shrinkage of the wood and probable glue separation.

Different kinds of wood used in a particular body may have considerable variation in their quality for absorbing moisture, hence quite a difference in their tendency to expand when excessive moisture is present during fabrication. When the body ultimately dries out in service severe internal strains are set up that cause the body to distort and the wood to check. When there is a difference in the moisture content in the individual pieces of a laminated part, delamination or pulling apart of the laminated pieces will result. This reference to the effect of improperly controlled moisture in wood is just one instance of the difficulties that can occur if processing is not carefully supervised by the manufacturer and not observed by the Ordnance Inspector. Wasteful methods in cutting and ripping are to be avoided. All acceptable wood must be utilized within the limits of the specification. Dimensional pieces containing defects must be carefully studied for the possibility of locating a prohibited defect in an area that will be subsequently cut away in further processing of the piece. Permissible defects in a piece are acceptable only when the defects are positioned in an area away from the principal point of strain, as set forth in the specifications.

None of the process requirements set forth in the specifications are unimportant and a systematic method of inspecting these operations from time to time should be developed. It is essential that the Ordnance Inspector acquaint himself with the inspection procedure of the manufacturer and when it is apparent that facility inspection is inadequate he should bring the matter to the attention of the factory management.

END PRODUCT INSPECTION or inspection of the product as it is presented by the manufacturer for acceptance is the most important duty of the Ordnance Inspector. The Inspector is actually buying an article for the United States Government for the use of troops and his decision as to the suitability of the product with regard to its conformity to the requirements of the contract, drawings and specifications is a serious responsibility. Quality in workmanship and material is essential and a uniformly high standard must be maintained so that durability and *interchangeability* are assured. Inspection for completeness is also very important, particularly when partially "knocked down" bodies are being shipped. Should any of the detached parts be missing from the pack, the bodies in

that particular pack would be unusable until the missing parts were subsequently obtained, which, under active service conditions might be impossible. Remember, one of the principal causes for the debacle of Napoleon's Russian Campaign was the neglect of someone to furnish an adequate supply of horseshoes for the horses of the transport. When military transportation fails, the Army invariably fails. Vigilance on the part of the Ordnance Inspector is a definite contribution to Victory. Let's do a good job.

SUB-STANDARD MATERIAL. The acceptance of sub-standard material is not generally permitted. There is a distinct difference as to what constitutes defective, dangerous, or otherwise faulty material and material that is acceptable, even though it could be rejected because of a technicality.

Inspectors must know whether or not the part is safe, whether or not it will function, and whether or not it is interchangeable. If there is any doubt, they should think well before rejecting a part because of some minor discrepancy. In all cases of doubt as to the "passing" of sub-standard material consult your immediate superior before decision is made. As long as the part is usable and does not affect the vehicle performance, its interchangeability, or the life of the part, its use may be considered. However, if the condition is chronic, locate the source of trouble and have it corrected. If allowed to continue without such action, the condition may become worse or get out of hand.

Conservation of wood makes it imperative that the inspector fully consider the possible usability of wood containing minor defects. The Manual illustrates and describes how, with proper placement, this wood can be utilized. (See Placement of wood containing minor defects.)

Inspection Memorandum No. 48 sets forth the procedure to be followed when a manufacturer requests permission to use sub-standard material. The procedure outlined is to be followed when there is any question as to the compliance of the material with the specifications.

Sound judgment must be used at all times in connection with tolerances and dimensions. Sub-standard materials fall into these three classes:

(1) Material which does not quite meet the drawings or specifications but which is still usable under certain conditions. Such parts may be used provided they will not affect interchangeability and that the usefulness of the equipment has not been reduced.

(2) Material which does not meet drawings or specifications but which may be OK'ed by proper authority for proof or training work.

(3) Material which is not acceptable.

In cases where questionable fabricated material is involved and no satisfactory decision is reached, the material should be held until the O. D. I. I. C. Key Inspector's next visit or in an emergency, the District involved should take the matter up with Inspection Section, Eng.-Mfg. Branch, Office, Chief of Ordnance—Detroit.

CONSERVATION OF WOOD, meaning the utilization of all wood that will conform to the requirement of the specifications is essential during the present shortage of first-grade stock. Proper storage of rough lumber, carefully planned cutting procedures, elimination of loss through mismanufacture and the proper location of wood containing minor defects, are conservation measures that should be enforced by wood body component manufacturers. Ordnance Inspectors should bring to the attention of the manufacturer any conservation measures that will result in the saving of wood.