PENNSYLVANIA RAILROAD
LINES EAST AND WEST OF PITTSBURGH

No. 60-B
ISSUED, ALTOONA, PA.

General Specifications for
STEEL PASSENGER EQUIPMENT CARS
(SUPERSEDING SPECIFICATION NO. 60-A, DATED AUGUST 26, 1909.)

The car must be built in the best, most substantial and workmanlike manner, according to the true intent of the specifications and drawings furnished, which are intended to include everything requisite to the proper building of the cars, notwithstanding that everything required may not be mentioned in the specifications or drawings. The drawings and specifications are intended to explain each other, and when anything is shown on drawings but not referred to in specifications, or when anything is referred to in specifications but not shown on drawings, the same shall be considered as being shown or referred to. When delivered, everything must be complete, and the cars must be ready for service.

A complete set of drawings, a copy of list of tracings, and material specifications will be furnished by the General Superintendent Motive Power for each contract, and no deviation from drawings or specifications will be allowed, except by authority in writing, from the General Superintendent Motive Power. Further drawings or information required by builders will be furnished upon request.

The detail specifications for material are as follows:

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INSPECTION.

Castings, steel plates, wheels, axles, journal boxes, journal springs, brake wheels, centre plates, plate glass, steel doors and possible, be inspected and tested at the place of manufacture, bearings, wedges, chains, head lining, will, whenever at Place of Manufacture.
Paints, bar iron, waste, journal bearings, and hose will be tested at Altoona, where samples must be sent.

Each car will be inspected during its construction, and after its completion, by authorized representatives of this Company, who may also inspect all parts to see that they conform to the drawings and specifications, and any materials or cars which do not conform will be rejected. Rejections at final inspection at the works of the car builders will be made irrespective of whether material has been previously accepted by material inspectors. The Railroad Company will not be responsible for material so rejected.

TRUCKS.

The following details must be made of wrought iron: Spring carrier, spring carrier hangers, brake clog hangers, brake rods and brake levers. All rivet holes must match without drifting, and rivets, after they are driven, must completely fill the holes.

Journal bearings will be furnished by the Pennsylvania Railroad Company.

Stop wedges and centre plates must be drop-forged steel, and must conform to gauges.

Journal boxes must be made to conform to drawings and gauges, fitted complete with dust guards and box lids, and must be well packed with wool waste, thoroughly saturated with Galena coach oil.

Axles must each be stamped on one end with letters designated by the Pennsylvania Railroad Company, to show who are the builders of the truck, and with figures to show the serial number of axle and date when put in service.

The journals, dust guard seats and wheel seats must be finished smooth, and true to gauges before the wheels are mounted; the journals must be burnished.

Both wheels on each axle must caliper alike, and must not vary in circumference more than one division on P. R. R. tape.

Wheels must be pressed on the axles at a pressure of not less than sixty-seven tons, and not more than eighty-three tons.

Springs must be selected to suit each weight of car.

The truck frames must be perfectly square and must be machine riveted.

The truck bolster must be of pressed steel, reinforced with angles and plates of the form and dimensions shown on drawings, and of material tested in accordance with P. R. R. specifications.

The initials and number of the car, and figures designating the class of helical and elliptical springs, must be stenciled on end rail:

A pine board not less than 3/4" thick must be placed in each side bearing pocket of four-wheeled trucks, underneath the bearing plate. Clearance between side bearings for all cars must be 4/4".

BODY.

The central girders must be riveted together, with sufficient camber to insure absence of sagging when car is complete.

The end casting must be so located that the top and front faces are in correct position relative to top flanges of centre channels.

The specified distance between inside face of knuckle and vertical face of end casting must be closely followed.
The bottom face of centre plate backing casting must project \( \frac{1}{8} \)" below lower flanges of centre sill channels, to insure proper contact with bottom coverplate.

The cars must be equipped with Westinghouse air brake, high-speed reducing valve, and American automatic slack adjuster, form “J” for 14” or 16” cylinders, and form “K” for 18” cylinders, as per drawings furnished. All air pipes must be tight under an air pressure of one hundred (100) pounds per square inch.

The outside plates must be perfectly flat, and drilled to template. All exposed rivet heads must have the special shape, shown on drawings.

All exposed butt joints must fit, and transverse roof sheet joints must be welded.

Acid dropped on sheets must be carefully removed, to prevent rust from forming under the paint.

Canvas soaked in white lead must be placed against deck plate, underneath deck sash frame and lower roof plate flange.

Window facing brackets attached to post must be faced, drilled and tapped to jig, so that the window sash will be interchangeable.

The flooring, inside of car and on platform, must consist of Monolith, or its approved equivalent, laid on metal, provided with clips or straps, spaced about 8” apart, and must not weigh more than fifty pounds per square yard. Tuscan red must be mixed with the monolith, the proportion being one in twenty-five by weight. This formula is given for guidance, but color and shade must conform strictly to sample furnished. After monolith floor is laid it is to be troweled three or four times to insure a smooth surface. After floor is thoroughly dry, it must receive one coat of boiled linseed oil.

The saloon floors must be covered with Asphalt, according to the following formula:

\[
\begin{align*}
25 & \text{ Pounds Asphalt} \\
122 & \text{ “ Grit} \\
203 & \text{ “ Neuchatel}
\end{align*}
\]

This material should be thoroughly boiled, and applied while hot.

All plates must be perfectly flat and smooth, and free from rust or scale. Ceiling linings must be glued with fire-proof glue to the back of all flat surfaces. The ceiling must be held in place by means of metal straps, and special shaped bolts and nuts, as per drawings. The butt joints in frieze moldings and mitre joints in door facings on bulkhead must be welded.

HEATING AND VENTILATING.

Passenger cars and passenger compartments in combined cars must be equipped with hoods, downtakes, ducts under floor, air passage ways through floor, and heater boxes, as per drawings.

The heating arrangement must include all necessary traps, inlet valves, end valves, hose and couplers, and must be tight under a steam pressure of 90 pounds. Pipe less than one and one-half inch in diameter must be double thick butt welded pipe. Pipe one and one-half and more in diameter must be single thick lap welded pipe.

LIGHTING.

All cars will be electrically lighted from axle generators or storage batteries.

Each car, unless otherwise ordered, must be equipped with a storage battery consisting of thirty-two cells, each of two hundred and eighty ampere hour rated capacity. The cells must be arranged in two compartment lead-lined tanks, all substantially as shown on standard tracings.

Each cell must contain six positive and seven negative plates, each approximately \( \frac{7}{8} \)" wide by 10" high. Unless otherwise specified, the positive plates must be made from 17-pound lead, and both positive and negative plates must be formed by the so-called Plante process.

All batteries will be furnished by the Railroad Company.
The batteries must be furnished complete, including elements, separators, insulators, tank linings and hand connectors, and must be fully formed, charged, and ready for service when applied to the car. The car companies must provide proper facilities for the care of and for recharging the batteries while stored at their works.

The conduit must be steel pipe, galvanized inside and outside, and must be of a quality approved by the Railroad Company.

All conduit must conform to the following table of weight and dimensions when delivered at the point where same is to be used. A maximum variation of five per cent. below the respective weights will be allowed.

<table>
<thead>
<tr>
<th>Diameter of Conduit, Inches</th>
<th>Thickness of Metal, Weight per Foot</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Nominal External</td>
</tr>
<tr>
<td>1/2”</td>
<td>.84</td>
</tr>
<tr>
<td>3/4”</td>
<td>1.050</td>
</tr>
<tr>
<td>1”</td>
<td>1.315</td>
</tr>
<tr>
<td>1 1/4”</td>
<td>1.660</td>
</tr>
<tr>
<td>1 1/2”</td>
<td>1.900</td>
</tr>
<tr>
<td>2”</td>
<td>2.375</td>
</tr>
</tbody>
</table>

All conduit must be furnished in lengths of at least 10 feet, unless otherwise specified, and with each length one coupling, galvanized inside and outside. If desired, the car builders may order the conduit cut to specified lengths.

The interior of the conduit must be smooth and free from burrs and fins. All conduit must be carefully examined before installation, and blistered or defective pieces rejected.

The length of thread on all conduit, as furnished by the manufacturers, must not exceed five-eighths of the length of coupling.

The ends of all conduit must be cut square and be taper-reamed so as to round off the inside edge of end of conduit.

All threads on conduit must be cut before the conduit is reamed.

All conduit must be installed in a first class manner, and all joints brought to a shoulder and made watertight.

All conduit connections to junction and other boxes where screw connections are not shown must be provided with approved bushings inside, and with approved locknuts both inside and outside.

No lubricants other than Ivory soap or soap-stone may be used to facilitate pulling wires into conduit.

All wires will be used to carry current at a normal working potential of 80 volts, with Wire, General a possible maximum working potential of 90 volts.

All workmanship and material must be first-class and the best of their respective kinds.

All wires must be stranded. Each strand must be of soft drawn annealed copper having Conductors a conductivity of not less than 98 per cent. pure copper, Matthiessen's standard, must be continuous throughout its length, and, except as otherwise specified, must be provided with a heavy uniform coating of tin without burrs or fins.

Each strand must be capable of withstanding without breaking thirty twists in six inches. It must be capable of being twice wound and unwound about a wire of its own diameter, making six turns at each operation. It must be capable of withstanding the elongation tests specified below. The above tests are to be made on separate pieces of wire.

<table>
<thead>
<tr>
<th>Size of Strands B. &amp; S. Gauge</th>
<th>Elongation in 10 Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 14 and smaller</td>
<td>25 per cent.</td>
</tr>
<tr>
<td>Nos. 16 to 18</td>
<td>20 per cent.</td>
</tr>
<tr>
<td>No. 19 and smaller</td>
<td>15 per cent.</td>
</tr>
</tbody>
</table>
All wires must be insulated with rubber compound and protected with double cotton braid. This braid must be saturated with a compound of such quality as will not be injurious to the cotton nor to the rubber. The conductor shall be insulated concentrically to the thickness of wall indicated with a rubber compound of such quality as will successfully meet all requirements specified below.

Fixture wire must be stranded and must conform to the requirements herein specified for rubber insulated wires, except that untinned conductors may be used, in which case the copper must be protected by a tight, close wind of fine cotton.

A strip of compound 4" long, taken evenly and smoothly from any conductor, must pass the following physical tests. A marked section 2" long, after being stretched to 6" and immediately released must return within one minute after release to 2¾", and must thereafter stand an ultimate elongation to 7⅜ before breaking.

Each length of insulated and braided conductor must withstand for a period of two minutes, after twenty-four hours immersion in water, and while still submerged, voltage tests as specified, from apparatus as required by the American Institute of Electrical Engineers.

After having successfully passed the specified voltage test, and while still submerged, the conductor must show, after one minute electrification by an E. M. F., of not less than 100 volts, insulation resistance not less than the megohms per mile specified below when corrected for a temperature of sixty degrees F.

<table>
<thead>
<tr>
<th>Size</th>
<th>Thickness of Insulation Wall</th>
<th>Strands</th>
<th>Volts Test</th>
<th>Megohms Per Mile at 60 Degrees F</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. &amp; S. Gauge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 4 Stranded</td>
<td>1-16&quot;</td>
<td>19</td>
<td>3000</td>
<td>400</td>
</tr>
<tr>
<td>&quot; 6 &quot;</td>
<td>1-16&quot;</td>
<td>7</td>
<td>3000</td>
<td>500</td>
</tr>
<tr>
<td>&quot; 8 &quot;</td>
<td>3-64&quot;</td>
<td>7</td>
<td>3000</td>
<td>800</td>
</tr>
<tr>
<td>&quot; 10 &quot;</td>
<td>3-64&quot;</td>
<td>7</td>
<td>3000</td>
<td>900</td>
</tr>
<tr>
<td>&quot; 12 &quot;</td>
<td>3-64&quot;</td>
<td>7</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>&quot; 14 &quot;</td>
<td>3-64&quot;</td>
<td>7</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>&quot; 16 Fixture&quot;</td>
<td>1-32&quot;</td>
<td>19</td>
<td>3000</td>
<td>700</td>
</tr>
</tbody>
</table>

Every joint and splice after being soldered and cleaned must be wrapped with approved rubber tape to a thickness equal to that of the insulation of the wire. The joint must then be covered with two layers of approved friction tape.

The rubber tape shall be made of a rubber compound which shall withstand the following tests. A marked section two inches long shall stretch to six inches and return to three inches in five seconds, and must thereafter stand an ultimate elongation of eight inches without breaking.

Material failing to meet the requirements of these specifications will be rejected by the Company's accredited representative, and returned to the manufacturer at the latter's expense.

**PAINTING.**

All surfaces throughout car must be thoroughly cleaned, and must be free from scale, rust, grease or acid when paint is applied. Sand blast should be used if necessary. Each coat of paint must be dry before succeeding coat is applied, and must be of approved quality.

Before assembling, all surfaces on truck parts throughout, including all concealed surfaces, but not including wheels and axles, must be covered with one coat of primer.

After assembling, all surfaces exposed to view after body of car has been placed on trucks, except wheels, must be covered with two coats of truck enamel.
During the process of construction, all parts of the underframe, including concealed surfaces, and surfaces where metal bears on metal, must be covered with two coats of good metal preservative of a non-inflammable nature. All accessible surfaces must be covered with a third coat of metal preservative coating when the structure is completed.

Before assembling, all parts made of iron or steel, including roof, must be covered with one coat of primer. A second coat of primer thinned with one quart of turpentine to one gallon of compound must be applied to all surfaces, including those which are concealed when car is completed. Wherever possible this second coat must be put on after the sheets are riveted in place.

After assembling, the outside of side and end sheathing, including letter plate and deck plate, must be covered with one coat of surfacer, glaze the rough and uneven places with "Surfacer Composition," then add four coats of surfacer, rub down with linseed oil and emery cloth, add two coats of Tuscan Red, followed by striping and lettering, then finish with three coats of finishing varnish.

The outside of the roof must be finished with one coat of P. R. R. freight car color, followed by one coat of a mixture composed of three parts, by volume, of mixed freight car color, and one part standard black.

For passenger cars and passenger end of combined cars, the top surface and edges of head lining must be painted with two coats of P. R. R. freight car color.

Special instructions for inside painting, with samples of color desired, will be furnished.

For baggage cars: The inside lining must be painted as follows: One coat enamel primer, dark; two coats of drab enamel.

The ceiling must be painted as follows: One coat enamel primer, white; two coats of white enamel.

For postal and storage cars, the inside lining must be painted as follows: Two coats of oak ground color—stippled; one coat of varnish. The radiators and screens must be bronzed.

The ceiling must be painted as follows: One coat of enamel primer, white; two coats of white enamel.

GENERAL SPECIFICATIONS.

Steel must be made by the open-hearth process, and must conform to separate specifications. Sheets for sheathing and lining will be inspected for surface, flatness and loading on cars.

The material under this heading will be ordered as "Bar Iron," and must conform to separate specification.

All iron required for forgings must be of the quality above specified, and must be capable of being worked at proper heat without injury.

All gray iron castings shall be made of tough gray iron, which shall exhibit a uniform and closely-grained fracture, free from any white, mottled or vitreous appearance. It shall be soft enough to be readily cut, drilled and chipped; and when struck on a corner or edge with a hammer, the metal shall indent and not break off.

Malleable iron castings must be of a clean, high-grade metal, evenly annealed throughout. When required for test, specimens of the annealed iron used for castings shall be furnished by the contractor. Such specimens shall show upon a test an ultimate strength of 40,000 pounds per square inch, an elongation of at least 2½ per cent. It shall be capable of bending to an angle of 80 degrees without showing a fracture on the convex side. All castings to be of shapes required, and to be lettered and numbered as indicated.

All steel castings shall be annealed. If required, the steel castings shall be made with a coupon for testing, which shall be cut off after annealing, and the test shall be made from a ¾" round cut from the coupon. The test piece shall show an ultimate strength of at least 70,000 pounds,
and an elastic limit of not less than 35,000 pounds, and elongation of at least 15 per cent. in 2". and a reduction of area of 20 per cent. at the point of fracture.

When the bearing surface of any steel casting is finished, there shall be no blow-hole visible exceeding 1" in any direction, nor exceeding \( \frac{1}{2} \) square inch in area. The length of blow-holes, gauged by any straight line in any direction, shall never exceed 1" in one foot.

All machine screws must be dipped in white lead before they are applied.

All glass intended for use in side windows of passenger carrying compartments must be polished plate glass, \( \frac{1}{8} \)" thick.

All glass for end doors, vestibule side doors, and end windows, must be polished plate glass \( \frac{1}{4} \)" thick.

All glass in postal, baggage and express cars, and in all compartments, except passenger compartments of combined cars, must be double-thick Crystal glass.

Standard P. R. R. practice must be followed in design and location of notices in cars.

All brass trimmings must conform in color to samples furnished, and must have a scratch brush finish and lacquered.

Hand railings in vestibule and outside of car body must have all roughness removed, and must be japanned.

A list of specialties will be furnished with each order of cars.

A. W. GIBBS,

General Superintendent Motive Power,

D. F. CRAWFORD,

General Superintendent Motive Power,
Penn. Lines West of Pittsburgh.

June 18, 1910.