

FGE

SPECIFICATION NO. BRBL-465-9-80-C

52 FT. 6" 70-TON RBL INSULATED BOX CARS

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SECTION 1 - PURPOSE & SCOPE

1.1 The specifications contained herein constitute engineering, design and quality requirements applicable to the design and construction of 52' 6" 70-ton nominal capacity, RBL insulated box cars, for CK Industries. Cars will be equipped with 20" travel hydraulic cushion unit, 12'-0" sliding plug doors centered on centerline of car. Underframe and floor will be designed for 50,000# front axle forklift load.

1.2 Portions of the following specifications and publications in effect at the date of specification will form a part of these specifications where applicable.

- AAR Specification for Design, Fabrication and Construction of Freight Cars
- AAR Supplement to Manual of Standards and Recommended Practices
- AAR Manual of Standards and Recommended Practices
- AAR Manual of Interchange Rules
- AAR Roller Bearing Manual
- AAR Wheel and Axle Manual
- AAR Lubrication Manual
- AISC Quality Criteria and Inspection Standards
- AISI Standards
- ASTM Standards
- AWS Welding Symbols and Practices
- Industrial Fasteners Institute Standards
- United States Safety Appliance Standards and Power Brake Requirements

Any changes in such standards, specifications and requirements after such date will be made at cost to the buyer.

In cases where a requirement stated in this document differs from that contained in the documents listed above, the specifications stated herein will govern. AAR Specification for Design, Fabrication and Construction of Freight Cars will herein be referred to as AAR Specs.



SECTION 1 - PURPOSE & SCOPE

- 1.3 Before proceeding with construction, the carbuilder's specification and construction drawings, in sufficient detail to permit evaluation of the design adequacy, will be submitted to the Customer for review and concurrence.
- 1.4 Manufacture and sale of cars pursuant to this specification are subject to applicable carbuilder's warranty and patent indemnity clauses.



SECTION 2 - PRINCIPAL DIMENSIONS

All dimensions are nominal. Manufacturing tolerances will follow Section 5.1.13 of the A.A.R. Specifications for Design, Fabrication and Construction of Freight Cars.

Length over striking plates.....	58'	1-3/4"	
Length inside between end linings.....	52'	6"	
Length center to center of trucks.....	42'	11"	
Length over pulling face of couplers.....	60'	9-1/4"	B
Width over side sill channel.....	9'	11"	
Width inside between linings.....	9'	6"	
Width over side plates.....	10'	1"	
Width over eaves.....	9'	4-5/8"	
Width extreme.....	10'	8"	
Width door openings (clear).....	12'	0"	
Height rail to center plate.....	2'	1-1/2"	
Height floor to ceiling.....	10'	6"	
Height rail to eaves.....	14'	10-1/16"	
Height top of rail to top of seam caps.....	15'	4-15/16"	
Height door openings (clear).....	10'	0-1/4"	
Height top of rail to top of car floor.....	3'	11-15/16"	
Capacity loading space, cubic ft.....	5237		
Truck wheel base.....	5'	8"	

SECTION 3 - NEGOTIABILITY

3.1 The cars will be designed to negotiate horizontal and vertical curves as listed below, without interference between trucks and car body, attached parts, or brake rigging. The design will include allowance for full truck spring deflection.

3.2 Horizontal

- A. Uncoupled car will negotiate 150 foot radius curve or less at simulated solid spring height.

The brake rigging will not be the limiting factor for truck rotation. Maximum truck rotation may be limited only by a structural car body component, not by any part of brake component system.

- B. Coupled to AAR base car with coupler in normal position, car will negotiate a 197 foot (29.4°) radius curve.
- C. Coupled to like car with coupler in normal position, car will negotiate a 175 foot (33.3°) radius curve.

Note: For over pulling face of couplers 56'-0 1/8" to 63' 0" minimum curve negotiability, when coupled to AAR base car, shall be 250' 0".

3.3 Vertical

- A. Uncoupled car will negotiate a 500 foot radius vertical curve.
- B. Coupled, with coupler in normal position, car will negotiate 500 foot radius vertical curve.
- C. Coupled, with maximum 3" offset, car will negotiate a 530 foot radius vertical curve.

SECTION 4 - CLEARANCE & SAFETY REQUIREMENTS

- 4.1 The car will conform to AAR clearance requirements, plate "C" Equipment Diagram for Limited Interchange Service.
- 4.2 All safety appliances will be in accordance with the United States Safety Appliance Standards and Power Brake Requirements as issued by the Federal Railway Administration.



SECTION 5 - DESIGN, FABRICATION & CONSTRUCTION REQUIREMENTS

General

- 5.1. The design and construction of the car will meet or exceed requirements outlined in AAR specifications of the issue applicable at the time of order acceptance.
- 5.2. Lift truck wheel loads will be in accordance with AAR Specs. 4.1.4.3. for front axle loads of 50,000 lbs.
- 5.3. The car structure will be designed to sustain the weight of the fully loaded car on jacks located at ends of the body bolsters to permit removal of trucks while car is jacked as outlined in AAR Specs. 4.1.6.
- 5.4. The car structure will be designed to sustain draft (tensile) or buff (compressive) drawbar and/or train action load as required by AAR Spec. 4.1.8.
- 5.5. The car structure will be designed to sustain a compressive columnar load as outlined in AAR Specs. 4.1.9. applied at rear draft lugs at each end of car on the nominal centerline of coupler.
- 5.6. The car structure will be designed and constructed so as to sustain the reaction and inertia forces resulting from single-ended impact as outlined in AAR Specs. 4.1.10.

Inspection

- 5.7. The CK Industries has the right to place as many inspectors as may be deemed necessary at the carbuilder's works, who will have free access at all times to all drawings and work that they may see that the provisions of the specifications are complied with in every respect.

Weight & Capacity

- 5.8. Each new car will be weighed separately, and the light weight (which will be the multiple of 100 lbs. nearest the scale weight, except when the scale weight indicated an even 50 lb., the lower multiple will be used), capacity in pounds, cubic capacity, station symbol, and the dates (month and year) will be marked thereon at the carbuilder's plant under the supervision of owner's inspectors. The accuracy of the scale will be certified.

SECTION 5 - DESIGN, FABRICATION & CONSTRUCTION REQUIREMENTS

5.9. Drawings & Specifications

All drawings together with any other drawings and separate specifications will form a part of this specification and will be regarded as a whole. The parts referred to in one and not in the other will be considered as appearing in both.

5.10. Microfilm

Aperture and slave card will be made to conform to AAR Spec. M-940 and supplied according to terms of contract.

Carbuilder's drawings will be separated from specialty manufacturer's drawings.

Drawing list will accompany microfilm.

5.11. Photographs

FGE Cars Inc. will furnish two (2) complete sets of black and white, 8" x 10", photographs of the following areas:

- A. Elevation "A" end
- B. Elevation "B" end
- C. Elevation right side
- D. Elevations left side
- E. Top view of car
- F. 3/4 view of assembled truck
- G. Interior view, as required to fully illustrate interior equipment, and showing portions of ceiling, side walls and floor.
- H. Top view of underframe
- I. 3/4 view of car

5.12. Material & Workmanship

All material and workmanship will be of the best quality and material accurately fitted to gauges and templates to insure thorough interchangeability.

SECTION 5 - DESIGN, FABRICATION & CONSTRUCTION REQUIREMENTS

5.13. Pattern Numbers

Castings will carry in raised letters and figures and Customer's pattern classification when requested or indicated on drawings.

5.14. Bolt & Nut Heads

All bolt heads will be in accordance with American Standard Regular Hexagon. All nuts will be American Standard and to suit standardization of wrenches as follows:

Finish Hexagon for 1/4" to 3/4" diameter
Regular Hexagon for 7/8" to 1-1/4" diameter
Heavy Hexagon for 1-3/8" and larger diameter

5.15. High Strength Bolts

High Strength steel bolts, specification ASTM A-449 or A-325 will be used for securing combined reservoir and "ABDW" valve to carbody brackets.

5.16. Self-Locking Capscrews

Self-locking capscrews will be used for securing all flanged pipe fittings on reservoir, retainer valve, "ABDW" valve and brake cylinder.

5.17. Self-Locking Nuts

Self-locking nuts where specified will conform to IFI-100 specification for grade "A" nuts.

Self-locking nuts conforming to IFI-100 specification for grade "B" nuts will be used on bolts securing "ABDW" valve, combined reservoir, brake cylinder, retaining valve, branch pipe tee, and angle cock "U" bolts to carbody supports.

5.18. Washers

Where bolt heads or nuts come in contact with wood, steel washers will be used, except under carriage bolt heads.



SECTION 5 - DESIGN, FABRICATION & CONSTRUCTION REQUIREMENTS

5.19. Lock Bolting and Riveting

Lock bolting or riveting will be done thoroughly and in a workmanlike manner in every respect.

Holes will match and have full bearing all around for the lock bolts. Holes will be reamed where necessary and the use of drift pins to enlarge unmatched holes will not be allowed.

Reaming will be done after pieces are assembled. Pieces will be firmly bolted together so that they will be in close contact.

All parts will be securely and tightly clamped or bolted together before lock bolting, and in no case the lock bolts be depended upon to draw the parts together.

Holes for lock bolts 3/8" diameter and under will be reamed 1/32" larger than rivet and 1/16" larger for lock bolts over 3/8" diameter.

Loose or otherwise defective lock bolts will be replaced. In removing these lock bolts, care will be taken not to injure the adjacent metal. If necessary, they will be drilled out.

Where cold rivets will be used, acceptance criteria for rivets will be per AISC Quality Criteria and Inspection standards table FF-1.

5.20. Welding

Welding will be done by the electric metallic arc or submerged melt process.

Welding symbols shown on drawings will be in accordance with American Welding Society standards.

Electrodes for welding will be of the class and type best suited for the kind of steel to be welded and to meet the necessary requirements for strength and impact.

Low hydrogen electrodes will be used on HTLA material. The edges and surfaces to be joined together will be accurately cut to size and form and all structural and safety items will be cleaned of all oil, grease, paint, water, scale or rust for a reasonable distance from the welding edge to provide a clean welding surface.



SECTION 5 - DESIGN, FABRICATION & CONSTRUCTION REQUIREMENTS

All slag or flux remaining on any bead of welding will be removed before laying down the next successive bead, except when electrode used is designed for multi-pass welding without slagging between passes. Any cracks or blow holes that appear on the surface of the bead of welding will be removed by chipping or grinding before depositing the next successive bead of welding. Finished welds will have slag and flux deposits removed.

Where welding is done on the underside of the welding groove prior to welding second side of groove, all oxidized metal that has dripped through will be removed, and the groove will be chipped or machined to permit complete penetration of the weld applied to the second side.

Welding procedures will be according to published AAR Requirements. In addition, AWS Requirements will be adhered to where AAR is silent.

5.21. Lubricating Truck Center Plates

Each truck center plate will be lubricated at the carbuilders works with five (4) Shell center plate lubricators. In addition, the vertical rim of the truck bowl is to be lubricated with Molybdenum Disulfide powder in Varsol.

Bearing surface of truck center plate will be cleaned and be free of paint, grease, and foreign matter before carbody is set on truck.

SECTION 6 - MATERIALS

6.1. Material used in the construction of cars will be in conformance with the AAR Specs., Section 3.1.

Steel castings will be specified to AAR M-201, ASTM A-27 or ASTM A-148. If castings are heat treated, they will be heat treated either by annealing, normalizing, normalizing and tempering or quenching and tempering.

Steel forgings will be specified to AAR M-126, AAR M-127, ASTM A-235, ASTM A-236, ASTM A-237, or ASTM A-238. AISI grades of carbon and alloy steel may also be specified for forging where, in combination with appropriate heat treatment, they will produce the desired mechanical properties. Where heat treatment is required, all forgings will be heat treated either by annealing, normalizing, normalizing and tempering, quenching and tempering or normalizing quenching and tempering.

Chemical composition for all low and medium strength castings and forgings will be controlled so that parts are readily weldable without preheating using conventional low hydrogen electrode.

All castings and forgings will be visually inspected for surface defects.

SECTION 6 - MATERIALS

The following specifications for material form a part of this specification. In all cases the latest revision of specification will be used.

AAR M-101	Axles, carbon steel, non-heat-treated and heat-treated
AAR M-107	Wheels, wrought carbon steel
AAR M-112	Steel bars, carbon, for railway springs
AAR M-114	Helical springs, heat-treated steel
AAR M-126	Forgings, carbon steel
AAR M-127	Forgings, alloy steel
AAR M-201	Steel castings
AAR M-202	Truck bolsters, design test requirements
AAR M-203	Truck side frames, design test requirements
AAR M-208	Wheels, cast carbon steel
AAR M-210	Purchase/Acceptance, approved side frames & bolsters applicable to interchange freight cars
AAR M-601	Hose, air brake and train air signal
AAR M-907	Lumber
AAR M-922	Self-locking nuts and self-locking cap screws
AAR M-924	Purchase/Acceptance, journal roller bearing adapters for freight cars
AAR M-926	Brake shoes, high friction type composition
AAR M-934	Freight car journal roller bearings
AAR M-940	Microfilm reproduction of engineering drawings and documents
AAR M-942	Journal roller bearing grease
AAR M-948	Truck side bearing
AAR B	Couplers and freight car draft components
AAR C-9	Specifications box car side doors outside hung (sliding)
AAR E-11	Specification for geared hand brake
AAR E-57	Specification for mechanical double-acting automatic slack adjuster for freight cars
WCLB #16	Lumber (West Coast Lumber Inspection Bureau)
ASTM A-27	Mild to medium strength carbon steel castings for structural purposes
ASTM A-31	Boiler rivet steel rivets
ASTM A-36	Plates, bar or rolled shapes of structural steel
ASTM A-47	Malleable iron castings
ASTM A-53	Pipe welded and seamless steel
ASTM A-148	High-strength steel castings for structural purposes

ASTM A-220	Pearlitic malleable iron
ASTM A-236	Carbon steel forgings for railway use
ASTM A-238	Forgings, alloy steel, for railway use
ASTM A-283	Lower and intermediate tensile strength carbon steel plated of structural quality
ASTM A-325	High strength bolts
ASTM A-413	Carbon steel chains
ASTM A-441	High strength low alloy structural Manganese-Vanadium steel
ASTM A-449	High strength bolts
ASTM A-502	Structural steel rivets
ASTM A-569	Hot rolled carbon steel sheets and strip, commercial quality
ASTM A-570	Flat rolled carbon steel sheets and strip, structural quality
ASTM A-572	High strength low alloy Columbium-Vanadium steels of structural quality
ASTM A-576	Special quality hot rolled carbon steel bars
ASTM A-607	Steel sheet and strip, high-strength, low-alloy requirements, merchant quality
ASTM A-675	Steel bars subject to mechanical property requirements, special quality
ASTM A-668	Steel forgings, carbon and alloy, for general industrial use



SECTION 7 - DETAIL SPECIFICATIONS

TRUCKS

7.1. Design

Trucks will be cast steel, AAR approved, of nominal 70-ton capacity with narrow pedestal side frames for application of 6" x 11" roller bearings, 3-11/16" spring travel and Barber S-2-C snubbing device with double side spring.

The truck wheel base tolerance will be indicated by button heads cast on the outer pedestal of side frame. Side frames with like number of buttons will be assembled in the same truck; however, a tolerance of one button on the frames paired in one truck may be used.

Wheel base.....5' 8"
Height, top of rail to top of center
plate of design.....25½"

Adapters

Adapters will be 6" x 11" class "E" roller bearing type, with hardened crowns and thrust shoulders, without heat indicator holes and will be designed for application to 70-ton truck narrow pedestal side frames.

Axles

Axles will be AAR standard, 6" x 11" class "E", grade "U" roller bearing type, with wrought turned journals and wheel seats, and turned between wheel seats to a finish of 250 micro-inches maximum. Axles will be ultrasonic inspected according to AAR specification M-101A.

Bolsters

Truck bolsters will be AAR standard for 14" diameter and 25-½" center plate height, 70-ton capacity grade "B" cast steel per AAR specification M-210 and approved in accordance with AAR specification M-202. Bolster will be designed for 3-11/16" spring travel.

Bolster will be arranged for Barber S-2-C snubbers, in accordance with Standard Car Truck's recommendation.

Bolster will have two-hole side bearing pads located on 50" centers.

TRUCKS

7.1. Bolsters (continued)

Center bowl will be machined and equipped with $\frac{1}{4}$ " x 1-3/8" manganese steel vertical wear ring, welded continuously according to AAR Spec. D-14E.1. Finished bowl will be 14" dia. x 1-3/8" deep.

The bearing surface of center plate bowl will be machined concentric, level, and parallel to the base of center plate and will be in accordance with truck center plate gauges.

Brake Beams

Brake beams will be #18 unit type and of the design for use with composition shoes and that will reject iron shoes.

Brake Beam Wear Plates

Brake beam wear plates will be AAR standard for unit type brake beams.

Brake Shoes

Brake shoes will be AAR standard 2" high friction composition car shoes, type AAR H-4 with guiding lugs.

Center Pin

Center pin will be 1-3/4" diameter ASTM A-576 G10200 steel.

Roller Bearings

Roller bearings will be AAR standard, 6" x 11" class "E" heavy duty type with fitted backing rings, without lubrication fittings (NFL) and will be mounted on axles in accordance with AAR Roller Bearing Manual.

Springs

Springs will be AAR standard 3-11/16" travel, D-5, twenty-eight (28) outer alloy steel and twelve (12) inner alloy steel coils for 70-ton Barber S-2-C with double side springs. Springs will be in accordance with AAR specification M-114 for alloy steel. All springs will be dip coated with Tectyl #506 to prevent rusting. AAR rated spring group capacity is 83,836 lbs.

TRUCKS

Side Bearings

Side bearings will be single roller type, Stucki #656-C, fastened to truck bolster with two (2) 7/8" Hex Head bolts and lock nuts. Shimming will be done under body sides bearing wedge.

Clearance will be measured with car on level tangent track with car body level. Clearance each side will be $\frac{1}{4}" \pm 1/16"$ before Shell lubricators are applied. Total side bearing clearances at BR and AL corners will be made the same as total clearances at BL and AR corners with permissible variations not to exceed 1/8". Application of lubricators will increase side bearing clearances by approximately 1/16".

Side Frames

Side Frames will be AAR standard, narrow pedestal type, grade "B" cast steel per AAR specification M-210, approved in accordance with AAR specification M-203 and designed for 70-ton 6" x 11" roller bearing application, unit brake beams, and 3-11/16" spring travel. Side frame will be cast to receive pedestal roof liner. C

Roller bearing retainer keys will not be provided

Snubbers

Cars will be equipped with Barber S-2-C snubbers with double coil side springs. Snubbing device will be designed for 3-11/16" spring travel.

Truck Levers & Connection Rod

Truck levers will be drop forged design. AISI C-1045 steel heat treated.

Wheels

Wheels will be AAR standard design CJ-33 one-wear class "U". Plates will be shot peened and rims ultrasonically tested. Wheels will be mounted on 6" x 11" axles at a pressure of not less than 85 tons and not more than 150 tons.

BRAKE SYSTEM

7.2. General

The car will be equipped with a complete AB 10" x 12" freight car brake system using "ABDW" valve, brake cylinder, release valve, and double acting automatic slack adjuster.

Brake rigging will be in accordance with latest AAR specification #2518 for "installation of Freight Car Brake Equipment" and will be designed for loads resulting from 90 PSI brake cylinder pressure, without exceeding AAR stress limits. Fulcrum points and their attachment brackets will be designed to loads resulting from 90 PSI cylinder pressure and 1.8 x hand brake load combined.

Brakes will be tested in accordance with AAR standard practice with all fittings, hoses, pipes, joints, and connections free of leaks when tested under 90 PSI air pressure.

All fittings will be short socket welded swivel flange, one gasket type except screw type elbows at angle cock. All levers, eyes, and jaws will be accurately drilled.

Note: The brake rigging will be capable of transmitting the designed braking force to each wheel under conditions created by the most adverse combination of wear and tolerances on the system components.

Air Brake Pins

All brake pins will be drop forged and hardened AISI C-1050 steel type of sizes required and secured by 5/16" x 2-1/2" Locktite cotters. Hardness will be RC-55 minimum to a depth of 1/8".

All holes for pins will be drilled.

Angle Cock

Angle Cock will be ball type with combination compression and threaded fitting and arranged for application with center of car cushion unit.

Brake Chain

Brake chain will be 9/16" straight link "BBB" proof coil.

BRAKE SYSTEM

Brake Levers

The body brake levers will be 1" thick full section, forged or cut from A-283 gr. D steel plate or bar and of such a width that forces resulting from the maximum brake cylinder pressure of 90 PSI will not produce stresses exceeding 23,000 PSI.

All holes for brake pins will be drilled 1/32" larger than respective pin diameter.

Brake Lever Badge

Brake lever badge plates will be stamped sheet metal showing dimensions of levers and will be applied to crossbearer in an accessible place near brake cylinder.

Brake Lever Guide

The brake lever guides will be of carbuilder's design and secured to car by welding.

Brake Rods

All brake rods will be 7/8" diameter ASTM A-675, grade 65, or such that forces resulting from the maximum brake cylinder pressure of 90 PSI will not produce stresses exceeding AAR maximum limit of 15,000 PSI.

Brake Rod Jaws

The brake rod jaws will be drop-forged of Schaefer's design, with holes for brake pins drilled 1/32" larger than pin diameter.

Brake Shoe Keys

Brake shoe keys will be AAR standard.

Brake Rigging Guides and Supports

Supports for brake rigging and equipment, including slack adjuster safety straps are to be lapped over the top of flanges of underframe members whenever possible. All brake rod supports are to be of closed-top design to prevent rods from becoming dislodged, and to be not less than two (2) inches wide. Brake lever guides to be made from flat bar.

BRAKE SYSTEM

Braking Ratio

Braking ratio will conform to AAR requirements for high friction composition shoes and based on 50 PSI will be designed as follows:

- A. Net brake force will not exceed 30% of light weight of car.
- B. Net brake force will not be less than 6- $\frac{1}{2}$ % of gross rail load.
- C. Net handbrake force will not be less than 11% of gross rail load.

Note: The total net brake shoe forces will be determined by a static dynamometer brake shoe test. The above percentages may be achieved within the range created by tapped and untapped readings.

Hand Brake

Hand brake, vertical wheel non-spin, quick release type, AAR 1966, certified and be of type specified by the Customer, and located in the low position utilizing the crossover step for a brake step. An AAR 66 bellcrank will be used.

Piping

All pipe and fittings will be in accordance with ASTM Spec. A-53, and will be extra strong except the end section at angle cock.

All piping will be well secured to underframe and body of car with IRE, "Wright" or equal pipe clamps, separated not more than 8 feet apart.

All piping will be well blown out with air while being pounded to remove scale or dirt loosened by bending. Both ends will be plugged until applied to car.

Branch Pipe Tee

Branch pipe tee will be of bolted design and supported in accordance with AAR Specification 2518.

Piston Travel

Slack adjuster will maintain 7- $\frac{1}{4}$ " \pm $\frac{1}{4}$ " piston travel.

Release Rod

Release rod will be applied in accordance with AAR specifications and will be $\frac{1}{2}$ " diameter A-663 grade 65 steel or equal.

BRAKE SYSTEM

Brake Hose

Brake hose will be AAR standard, 22" long x 1-3/8" I.D. hose.

Slack Adjuster

Slack adjuster will be automatic double acting type conforming to AAR specifications. It will be installed with 81" nominal extension, and be adjusted to maintain $7\frac{1}{4}" \pm \frac{1}{4}"$ piston travel.

Retaining Valve

Retainer valve will be the three position type and mounted according to latest AAR recommendations.

DRAFT DETAILS

7.3. Couplers

Couplers will be E60C-HT AAR standard type "E" freight car couplers, grade "C" cast steel, solid butt, single articulated rotary, bottom operating. Coupler knuckle pin cotters will be removed prior to shipment of cars.

Coupler Release Rigging

Coupler release rigging will be Standard Railway design, style #5 and 20" travel cushion underframe with standard striker opening and bottom operated coupler.

Striker and Coupler Carrier

Striker will be welded steel configuration and designed to sustain 50,000# vertical load applied at coupler pulling fact, as outlined in AAR Spec. 4.1.5.

Coupler carrier wear plate will be forged or cast, appropriate design to suite coupler carrier.

Cushion Unit

Cushion unit will be 20" travel all welded, designed for a 70-ton car and applied in accordance with manufacturer's recommendations.

Draftgear

Waughmat type WM-CG-5 cushions.

B

UNDERFRAME

7.4. General Design - Cushioned Car

Underframe will be welded sliding sill design and hereinafter when referred to as "completed underframe" will consist of the underframe and all 20" travel cushion unit components applied to the underframe.

Stationary sill, side sills, body bolsters, crossbearers, crossties, stringers, and other necessary underframe structural members will be of the carbuilder's design and will be designed to carry a 50,000# AAR floor load rating.

Camber

Camber in completed underframe measured between centers of both bolsters will be as follows:

Stationary sills and side sills will have a positive camber not exceeding 3/8".

Underframe jigs and welding procedure will obtain a completed underframe meeting the above requirements.

Care will be exercised in the handling of completed underframe with cranes to prevent bending or twisting of underframe that would cause permanent distortion.

Body Bolsters

Body bolsters, two (2) per car, will be designed in accordance with paragraph 4.4.13 of the AAR Specification, and will be built up welded steel design consisting of:

Web plates of 7/16" ASTM A-572, grade 50 steel.

Top cover plate of 5/8" x 30" ASTM A-572, grade 50 steel. C

Bottom cover plate of 5/8" x 30" ASTM A-572, grade 50 steel. C

Top cover plates will be secured to stationary sill by welding. Bolster will be reinforced over side bearings with 3/8" ASTM A-36 pressed filler welded to web plates and bottom cover plate with web plate at the break point. Bottom cover plates will have derrick lift holes.

UNDERFRAME

Body Center Plates

Body center plates will be 14" dia., cast steel. Bearing surface to 301-327 BHN flame hardened. Center plates will be applied in accordance with manufacturer recommendation.

Body Side Bearings

Side bearings will be forged wedge section 4" wide to fit shape of body bolster, made of ASTM A-576 G 10400 steel hardened to 277-375 BHN and secured to bolster bottom cover plates with two (2) 3/4" diameter #3 flat head plow bolts, ASTM A-449, hardened washers, and heavy hex, A-325 nuts. Nuts will be torqued to a minimum of 300 ft. lbs. and tack welded to bolts. Bottom face of side bearing will have bolt holes countersunk, and the countersunk heads of bolts will not project below face. Side bearing will be adjusted in accordance with AAR Specifications with a maximum of two (2) shims.

Crossbearers

Crossbearers, four (4) per car, will be designed in accordance with paragraph 4.4.5.2 of the AAR Specs. and will be built up welded design consisting of the following:

Web plates of 1/2" ASTM A-572 gr. 50 steel.

Top and bottom cover plate of 5/16" x 8" ASTM A-572 gr. 50 steel.

Two bottom cover plates will be connected by an ASTM A-36 formed channel tie.

Crossties

Fourteen (14) per car crossties designed in accordance with paragraph 4.4.4 of the AAR Specs., and of S6 x 9.0 lbs/Ft. ASTM A-572 grade 50 steel extending from stationary sill to side sill channel. Crossties will be securely welded to stationary sill and side sill webs.

Defect Car Receptacle

Defect card receptacle, one per car, will meet AAR requirements, and will be secured to side sill channel on reservoir side of car as shown on drawings.

UNDERFRAME

Draft Sill

Draft sill will be made of two (2) AAR CZ-13 sections of A-572 grade 50 steel at 41.2# per foot. The inner edges of the top horizontal flanges of the zees will be joined together the full length by continuous weld having 60% minimum penetration except there will be 100% penetration from the striker to a distance of two feet beyond the center line of bolster.

End Sills

End sill will be 6" x 4" x 3/8" ASTM A-36 steel angle with 6" leg horizontal, welded to center sill and secured to side sill with 1/4" ASTM A-36 gussets. C

Floor Stringers

Floor stringers will consist of:

Six (6) per car S3 x 5.7 ASTM A-572 grade 50 steel between inboard bolster, three (3) each side centerline.

Twelve (12) per car S3 x 5.7 ASTM A-572 grade 50, end sill to bolster.

Jacking Pads

Side sill at bolster will be reinforced to provide place for jacking fully loaded car off the trucks.

Side Sill Channel

Side sill will be MC15 x 33.9#/ft ASTM A-36 steel and will extend full length of car. Depth of channel will be reduced as ends of sill to provide clearance for steps, and jacking pads.

Sill Corner Steps

Four (4) sill steps of 3/8" x 2" ASTM A-576 G 10150 steel will be located one at each corner of car, securely riveted to side sill with 5/8" rivets. Holes to be drilled or reamed.

SUPERSTRUCTURE

General

7.5 Sides will be of all welded design with formed hat type exterior side posts.

Cars will be provided with 12'-0" wide x 10'-0 $\frac{1}{2}$ " high clear door openings centered on centerline of car.

Interior surfaces will be smooth and without protrusions their full length and height except at door header reinforcement. In addition side sheet seams at side posts will have weld crowns 3/32" maximum but without sharp edges.

Sides will be assembled in jigs, and completed sides will be straight and true. Side sheet buckles may range + $\frac{1}{2}$ " from nominal plane. Care will be exercised in the handling of completed sides by cranes to prevent twisting of sides that would cause permanent distortion.

Corner Posts

Corner posts, four (4) per car, will be of 3/8" ASTM A-572 grade 42 steel plate and secured to side sheets, side plate, side sill and steel ends.

Doors

Doors will be single sliding plug type having 12'-0" wide x 10'-0 $\frac{1}{2}$ " high clear door opening located on centerline of the car. Doors will be equipped with anti-pilferage lock and will be in accordance with current AAR requirements.

All operating handles and locking devices will be located for convenient operation from the ground and the loading dock.

Ends

Ends will be Stanray's design 5" deep corrugated non-terminating. Top section to be 3/16" thick ASTM A-572 Gr. 50, bottom section to be $\frac{1}{2}$ " thick ASTM A-572 Gr. 50. C

Ends will be provided with keyslots for securing ladders, end handholds and platform brackets with bolts, neoprene gasket and GT washers.

SUPERSTRUCTURE

Placard Boards

Placard boards, four (4) per car, will be secured with formed steel brackets which will be welded to steel ends and sides in standard location as per AAR Manual of Standards and Recommended Practices, Page C-18. Placard boards shall be 25/32" thick T & G, long and/or short leaf yellow pine, AAR Group 3, Paragraph 55, kiln dried to 12% moisture content. Plywood may be used as alternate.

Roof

Roof will be galvanized C.B. steel, diagonal panel roof with seam caps, unpainted, applied to side plate and ends by riveting. Intermediate panels will be 14 ga. material end panels and seam caps will be 12 ga. material.

Routing Car Boards

Routing card boards, two (2) per car, will be secured with formed steel brackets welded to car in location conforming to standard location as per AAR Manual of Standards and Recommended Practices, Page C-18. Routing card boards shall be 25/32" thick T & G, long and/or short leaf yellow pine, AAR Group 3, Paragraph 55, kiln dried to 12% moisture content. Plywood may be used as alternate.

Side Handholds

Side handholds will be sixteen (16) per car, of 3/4" diameter A-576 G10150 steel securely bolted to side and corner posts with 1/2" diameter bolts and GT washers.

Door Posts

Door posts will be formed of 5/16" A-569 steel reinforced with a 1/4" formed channel and 5/16" A-36 steel gusset at the side sill.

Side Plate

Side plates, two (2) per car, made by forming and welding from 1/4" ASTM A-569 steel.

Side Posts

Side posts twenty-four (24) per car, will be 2 1/2" deep formed hat sections of 1/4" ASTM A-572 grade 42 steel and secured to side sheets, side plates, and side sill.

SUPERSTRUCTURE

Side Sheets

Side sheets will be of .10" nominal thickness hot rolled, A-659 carbon steel.

Side Sill

Side sill will be ½ x 6 x 6 A-36 angle coped at door opening.

Threshold

Threshold will be formed 3/16" A-283 steel.

Carline

Five carlines at the doorway and 2 additional on each end of the body are reinforced with steel angle.

End Lining

End lining to be 3/4" Douglas Fir plywood exterior type with one "A" face and one "C" face.

Flooring

Top floor to be 2½" horizontal laminated, hardwood through the doorway area and Southern Pine (or equal) at each end of the car.

Ceiling

Plywood - Douglas Fir exterior type 3/8" with one "A" face and "C" face nailed to carlines with 2" Screw Type Nails. Flashing to be applied at juncture of side wall and ceiling beyond load divider tracks.

Door Lining

Door lining to be 1/8" fiberglas.

Insulation

Floor - 3-9/16" foamed-in-place with 2# density polyurethane between wood stringers.

Sides - 3-1/4" foamed-in-place with 2# density polyurethane insulation

SUPERSTRUCTURE

Insulation (continued)

- Ends - 4-1/2" foamed-in-place with 2# density polyurethane insulation between wood stringers.
- Roof - 5-1/2" foamed-in-place with 2# density polyurethane insulation between carlines.
- Doors - 2-3/4" foamed-in-place with 2# density polyurethane insulation.

Safety Appliances

Safety appliances will be designed and applied as shown on applicable drawings and in accordance with United States Safety Appliances Standard, FRA - Railroad Safety Appliances Standard.

Platforms

End platforms will be perforated plate design, 8" x 60" size galvanized and bolted to supports with 1/2" bolts.

Supports will be fastened to steel end with 1/2" flat neck bolts with "GT" washers. Four (4) two piece supports per end will be provided and will be fabricated of 1/2" ASTM A-36 steel flat bar.

Bulkheads

System "A" - 160,000 lbs. capacity with two steel primary bulkheads and two steel secondary bulkheads will be installed complete with 19'-0" crane rail and floor track centered in doorway.

C

SECTION 8 - PAINTING, LETTERING & NUMBERING

8.1. Paint

General

All paints will be chromate and lead-free and comply with specifications and colors to conform in shade to Drift Control Panels specified.

Paints will be thoroughly agitated prior to application to insure complete mixture of pigments and vehicles. Thinning of paints when necessary will be done in accordance with paint manufacturer's recommendations.

Paints will be applied by conventional or airless spray method in a workmanlike manner to obtain even and uniform coats. Sufficient time will be allowed between coats for proper drying.

Surfaces on underframe and body of car, which will be inaccessible after assembly, including draft gear pockets, will be given a priming coat of chromate-free primer.

Caulking

All riveted exterior lap joints will be caulked with Tremco JS-760 caulking compound, or approved equivalent. All seam caps and both side and end fascia sealed with Tremco JS-760 compound applied in such a manner that an absolute air tight seal is assured. All insulation plugs in roof and side plate to be sealed with "Alumination" #301 roof coating.

Lap Joints

All metal to metal lap joints will be painted with chromate-free lap joint paint.

Cleaning

Prior to painting, exterior and interior steel surfaces of sides and ends will be thoroughly cleaned to remove grease, and foreign matter, and exterior surfaces will be grit blasted to remove rust and mill scale.

Trucks will be removed from car during grit-blasting or will be adequately protected during this process.

PAINT 8 - PAINTING, LETTERING & NUMBERING

Trucks

Side frames, bolsters, and truck parts will be given one coat of light-bodied black mineral paint by manufacturer before shipment to carbuilder. No additional painting will be done on trucks by carbuilder.

Underframe

Must be given one coat of approved primer paint and when thoroughly dry, one coat of approved finish paint except that side sill outer surface must be painted like side. (Also see general painting.)

Steel Sides

Exterior to be given one coat of approved primer paint by manufacturer and one coat of approved enamel as called for including door fixtures and safety appliances.

Door

Sheathing exterior to be given one coat of approved primer paint by manufacturer and one coat each of approved enamel as called for. Inside surface of door sheathing to be given one coat of approved primer paint by door manufacturer.

Ends

Exterior and interior to be given one coat of approved primer paint by manufacturer. Outside including safety appliances to be given one coat of approved enamel as called for after application to car.

Roof

Exterior not to be painted; all roof eave and seam cap rivets to be painted aluminum.

Interior: Side lining, end lining, ceiling, etc., to be given one coat of approved LV-35 Vernix Sealer and Hardener.

Stenciling

As called for on drawings.



SECTION 8 - PAINTING, LETTERING & NUMBERING

Miscellaneous

Top of sliding center sill that extends beyond steel ends to be coated with a non-skid paint - both ends of car.

8.2 Lettering and Numbering

All stencilling on outside of car will be done in a workmanlike manner to provide for sharp, clean-cut stencilling without fogging and to provide for two mil dry film thickness.

Location of all stencilling will be in accordance with stencil drawing supplied by customer.

Paint Record

Painting record will be stenciled in location as shown on stencil drawing if requested.

Builder's Imprint

Location of builder's imprint will be as shown on stencil drawing.

Ownership

Ownership stencil, when desired by the Customer, will be located as shown on stencil drawings and will be in accordance with Customer's instructions.