



# FIRST ENERGY

## RD VI

**RAPID DISCHARGE® COAL CAR**  
**4,120 Cubic Foot Capacity - Level Full**  
**4,516 Cubic Foot Capacity – with 10” Heap**

**119 Ton, Aluminum Body - Steel Underframe**  
**with Rotary Couplers**

**SPECIFICATION NO. HTS-4207-D5Q156-PB7**

**Revision “C”**  
**July 24, 2006**

Written by: CCH

General Arrangement Drawing.: Z-042-2429

This specification is the property of Trinity North America Freight Car, Inc and contains confidential and proprietary information and is loaned for engineering review only. It may not be copied or used for any other purpose without the written consent of Trinity Freight Car, Inc.

**Revision History Sheet**

<b>Revision Letter</b>	<b>Date</b>	<b>Description of Change</b>	<b>Approved By</b>
	09-30-2005	Initial Release	CCH
A	05-16-2006	Updated to TILC specialty standards, extreme height now 13' - 4"; capacity now 4,120 CF	CCH
B	05-19-2006	Side Bearing now 4500-LT, per C.O. Rev. C	CCH
C	07-24-2006	Revised per C.O.s Rev. E & F.	CCH

### **TABLE OF CONTENTS**

General Specification	1.0
General Dimensions	2.0
Car Construction Details	3.0
Door Operating Mechanism	4.0
Painting & Markings	5.0
Specialty List	6.0
Documentation	7.0

## **1.0 GENERAL SPECIFICATIONS**

### **1.1 DESCRIPTION**

Car described in this specification is a 119-ton riveted/bolted aluminum body, welded steel underframe, 5 pocket, automatic unloading, RAPID DISCHARGE ® RD VI coal car. The three (3) center pockets consist of two doors on each side of the center sill with the bottom (free) edge of the doors abutting each other. Each end pocket consists of one (1) door on each side of the center sill with the bottom edge abutting the bottom edge of the lower slope sheet. This specification is intended to include everything requisite to the proper building of the car, notwithstanding that everything required might not be mentioned.

The car is constructed in accordance with Association of American Railroads (AAR), Federal Railroad Administration (FRA) and other governmental regulations known to be in effect as of the date of this specification. The drawings, templates, gauges and materials will be as specified in the AAR manual of Standards and Recommended Practices, Section C, Part II. The car is constructed for 286,000 pounds gross rail load (GRL) in accordance with AAR Standard S-286-2002. The car builder provides proper fixtures for construction to insure good fit-up and alignment of subassemblies and completed car. The welding is to be performed in accordance with Chapter V of the AAR Manual, Section C, Part II and the A.W.S. D15.1 Railroad Welding Specification.

### **1.2 INTERCHANGE**

The AAR 263,000 lb. per car 4 wheel truck weight and axle spacing criteria, 2.1.2.2 of Section C, Part II, Volume 1, Manual of Standards and Recommended Practices M-1001 is exceeded with a track load of 286,000 lb. per car on 4 wheel trucks.

The car described herein does include trucks that meet the requirements of design validation track testing as described in AAR specification M-976.

### **1.3 MATERIAL**

All rolled steel shall meet current AAR specifications, Section 3.1, and material unless otherwise specified, to be minimum requirements as follows:

1. Sheets under 3/16" thick to be ASTM A-1011, Grade 33.
2. Plates 3/16" thick and above to be ASTM A-36.
3. Shapes and bars to be ASTM A-36.
4. Bars for handholds and ladder tread material to be ASTM A-576, Grade 1015-1020.
5. If substitutions are necessary, shapes, plates, and bars, composition of which corresponds to the AISI standard grades of carbon steel may be substituted.
6. Aluminum plates and sheets to be alloy 5083-H321 or 5083-H323.
7. Aluminum extrusions to be alloy 6061-T6.
8. Aluminum may have water stains and/or scratches, which are not structurally detrimental.

#### 1.4 RIVETS AND BOLTS

Per current AAR specification, Section 3.1 of AAR Manual of Standards, Section C-II. Aluminum rivets for the side and end assemblies to be 6061-T6. Steel bolts and/or nuts (collars) in contact with aluminum to be plated.

All rivets and bolts in the major car body structure to be 5/8" diameter or larger.

#### 1.5 BRAKING POWER

To be equipped with a body-mounted 10" x 12" brake system, with double acting automatic slack adjuster. The air brake system shall be designed and applied in accordance with the current AAR specification No. S-401, current revision. The brake shoe forces as determined by the static dynamometer, based on the brake cylinder equalization pressure of 63.5 to 66 psi, shall be:

Loaded Car Brake Ratio, % of Gross Rail Load (286,000 lbs)  
minimum 11%  
maximum 14%

Empty Car Brake Ratio, % of Light Weight  
minimum 15%  
maximum 32%

Hand Brake Ratio, % of Gross Rail Load (286,000 lbs)  
minimum 10%

#### 1.6 BRAKE PIPE

Extra heavy steel pipe is used for all piping for brake equipment, in accordance with AAR Standard S-401 and S-400, latest revision. All piping is secured to underframe of car with wedge type pipe anchors.



## **2.0 GENERAL DIMENSIONS**

### **2.1 CAR DATA**

Length, Inside	48' - 2"
Length Over Coupler Pulling Faces	53' - 1"
Length Over Strikers	50' - 5-1/2 "
Length Between Truck Centers	40' - 6"
Truck Wheelbase	5' - 10"
Width Over Top Chords	10' - 7-7/8"
Width, Inside	9' - 10-3/8"
Height, Extreme	13' - 4"
Height, Over Top Chords	13' - 3"
Estimated Average LightWeight	48,900 Lbs.
Estimated Average Load Limit (Based on 286,000# GRL)	237,100 Lbs.
Nominal Capacity (Based on 286,000# GRL)	119 Tons
Cubic Capacity Level Full (approximate)	4,120 Cu. Ft.
Cubic Capacity with 10" Average Heap (approximate)	4,516 Cu. Ft.
Slope of Floor Sheets	45° & 60°

### **2.2 CENTER OF GRAVITY - ESTIMATED**

Empty Car	41.1"
Loaded to 286,000# GRL Level Full	89.8"
Loaded to 286,000 GRL with 10" Heap	94.3"

### **2.3 CURVE NEGOTIABILITY (PER AAR)**

Horizontal, coupled to Like or Base car	180 Ft. radius
Horizontal, uncoupled	150 Ft. radius
Vertical, uncoupled	500 Ft. radius

### **3.0 CAR CONSTRUCTION DETAILS**

#### **3.1 CENTER SILLS**

Two (2) AAR CSC sections extending between draft sills. Top flanges to be continuously welded together with full penetration weld. Spreaders to be 3/8" steel plate.

#### **3.2 DRAFT SILLS**

Grade "B+" cast steel with integral striker, draft lugs, center filler and 15 -7/8" diameter machined and hardened center plate. Front draft lugs to withstand force of 900,000 lbs. including 1.8 load factor. Draft sill to be fitted with two steel draft gear carriers.

#### **3.3 BODY BOLSTER**

Each body bolster (2 per car) to consist of the following major components:

Shear Plate	1/2" x 24"	A-572 Gr.50
Upper Bolster Web Plate	1/4"	A-572 Gr.50
Lower Bolster Double Web Plates	5/16"	A-572 Gr.50
Bolster Bottom Cover Plate	1/2" x 20"	A-572 Gr.50

#### **3.4 TRANSVERSE RIDGES**

Transverse ridge slope sheet is 1/4" aluminum plate applied at 55 degrees. Transverse ridges number four (4) per car.

#### **3.5 SLOPE SHEETS**

Upper, intermediate, and lower (end hopper) slope sheets are 7/32" and 1/4" aluminum plate. Upper slope sheet is applied at 45 degrees, intermediate slope at 45 degrees, and lower slope at 60 degrees from horizontal.

#### **3.6 HOPPER**

Hoppers number five (5) pockets per car, with the doors hinged at the transverse ridge. The three (3) center pockets consist of two doors on each side of the center sill with the bottom (free) edge of the doors abutting each other. Each end pocket consists of one (1) door on each side of the center sill with the bottom edge abutting the bottom edge of the lower slope sheet. Doors are locked with the RAPID DISCHARGE® air operated door mechanism and a secondary latch at the air cylinder. (See Section 5.00).

Inside hopper sheets are 1/4" aluminum plate reinforced at the door opening with a pressed (integral) 1" offset. Outside hopper sheets are 1/4" aluminum plate reinforced at the door opening with a pressed (integral) 2-7/16" offset

### 3.7 LONGITUDINAL HOODS

Longitudinal hood sheets sloped at 55 degrees are 1/4" aluminum plate.

### 3.8 DOORS

Door sheets are 1/4" aluminum plate with upturned flanges at the top (hinge), inboard and outboard edges and downturned flange at the bottom (free) edge. Each door sheet is stiffened with two longitudinal 3" x 3" x 3/16" steel angles extending from door spreader to the hinge which pivots on hardened steel pin. Door spreader is 3/16" A-572 Grade 50 steel pressed hat shape section extending from side to side.

### 3.9 SIDE SHEETS

Lower, upper and corner side sheets to be 0.18" aluminum arranged with a riveted/bolted longitudinal lap seam.

### 3.10 TOP SIDE CHORDS

Heavy-duty "P" shape aluminum extrusion with integral shaker/clamp wear bar extending from end to end.

### 3.11 SIDE SILL

Special aluminum "Z" extrusion extending between bolsters and 5" x 3-1/2" x 3/8" aluminum angle from bolster to end sill.

### 3.12 SIDE STAKES

Hat shaped 6061-T51 aluminum. Side stakes will number eleven (11) per side.

### 3.13 SIDE BRACES

Sides are braced diagonally at each transverse ridge with an oval aluminum extrusion, four (4) per side, eight (8) per car. Sides are tied together at each end and in the center with an oval horizontal aluminum extrusion, three (3) per car. All side brace connections include a vibration dampening element.

### 3.14 END SHEETS

1/4" aluminum plate with a pressed integral 6" channel on the top edge to form the end top chord and flange on the bottom edge to support the slope sheet.

### 3.15 END SILLS

6" x 3-1/2" x 1/2" 6061-T6 aluminum angles.



### 3.16 CORNER POSTS

Four (4) per car, 3-1/2" x 3-1/2" x 1/4" 6061-T6 aluminum angles. Side and end sheets are connected by corner post.

### 3.17 END POSTS

3" x 2-1/2" x 1/4" 6061-T6 aluminum angles.

### 3.18 TOP CORNER CONNECTIONS

3/8" steel plate bolted to top side and end chords. A 1/4" web is welded to the corner cap.

### 3.19 HANDHOLDS

3/4" diameter forging of A-576, Grade 1015-1020 steel. Handholds over 36" long to be 1" diameter.

### 3.20 LADDERS, END AND SIDE

2-1/2" x 2-1/2" x 1/4" 6061-T6 aluminum angles fastened with 5/8" diameter fasteners.

### 3.21 SILL STEPS

1/2" x 2" ASTM A-576, Grade 1015-1020 steel bar and are located at each corner of car and secured with 5/8" diameter fasteners.

### 3.22 ECP Electronic Brake System

Conduit only for future addition of ECP Electronic Brake System will be supplied on these cars.

#### **4.0 DOOR OPERATING MECHANISM**

RAPID DISCHARGE ® door operating system which is designed for automatic operation while the car is in motion, is accomplished with power supplied by a double acting 14" diameter pneumatic cylinder with fiberglass tube mounted above the center sill near the "A" end of the car. A pneumatic solenoid operated spool valve is mounted in a lockable control box at the "A" end of the car and has solenoids designed for 24 volt DC operation. These operate in conjunction with purchaser's trackside source of 24-32 (30 preferred) volt DC electric power.

On diagonally opposite corners of car, spring-loaded "third rail" pick-up shoes are provided to engage purchaser's trackside unit. Pick-up shoes, when extended to operating "ungagged" position, will extend car width to 11'- 0" at a point approximately 32" above the top of the rail. Pick-up shoes are arranged so that they can be "gagged" to be within the AAR clearance line. Pick-up shoes are mounted approximately 18" inboard of the bolster center at the "BL" and "AR" corners of the car. Gag pins are included at both pick-up shoes.

Cars are equipped with a separate air trainline for supply from the locomotive main reservoir equalizing line to a car mounted 30-gallon vertical reservoir. Dump air end cocks and hoses are mounted in the low position. Complete car dump air system is operable at 90 psi and is designed for 150 psi maximum with reservoir ASME Code stamped accordingly. Air system is independent of the car braking system.

## **5.0 PAINTING & MARKINGS**

### **5.1 GENERAL**

All paint material will meet current environmental laws for volatile organic compound. All paint material is lead and chrome free.

### **5.2 CLEANING**

All steel surfaces to be painted or primed are cleaned free of rust, scale, grease, dirt, and moisture by means of washing, wire brushing or SSPC-SP6 commercial blast prior to painting.

### **5.3 STEEL TO ALUMINUM JOINTS**

Steel contact surfaces to be primed before application of aluminum components. One coat of non-curing mastic, PVC tape or other Trinity Rail Group approved barrier material to be applied to steel prior to application of aluminum components.

### **5.4 INACCESSIBLE OR HIDDEN SURFACES**

Where practical steel surfaces of underframe and car body, which are inaccessible after assembly, including draft gear pockets, are given one coat of primer.

### **5.5 UNDERFRAME**

The underframe and other steel components of car body are given one coat of water based direct-to-metal black paint to obtain a dry film thickness of 4 mils minimum. Paint will be Williams-Hayward Thermalbond Graphite with flat finish (62-11669).

### **5.6 STENCILS/DECALS**

Stenciling is in accordance with AAR Manual of Standards and Recommended Practices, Page L36, latest revision. Decals will be used on car body. Rotary end will be identified by applying Apple Red decals to the upper section of the end sheet and end side panels.

### **5.7 TRUCKS**

Truck side frames and bolsters, as received from manufacturer, have a fog coat of light-bodied black paint. Trucks are stenciled with customer's reporting marks and car number on side of each bolster facing outboard end of car.

### **5.8 DELINEATORS/REFLECTORIZATION**

In compliance with DOT/FRA 49 CFR Part 224.



## 6.0 SPECIALTY LIST

ITEM	DESCRIPTION	SUPPLIER
1	Wheels Class "C" - 1W 36", mounting pressure 105-160 tons	Griffin
2	Axles AAR M-101 Grade "F", 6-1/2" x 9"	Std Forge
3	Roller Bearings AAR NFL, Class "K", 6-1/2" x 9"	Brenco
4	Adapters 6-1/2" x 9", Pennsy Adaptor Plus	ASF
5	Truck Side Frame Gr "B+" Steel to AAR M-203 & M-210 Column Wear Plates Bolted Only	ASF
6	Truck Bolster: Gr "B+" Steel to AAR M-202, M-210 & S-305	ASF
7	Center Plate Liners 1-3/4" x 16" dia net Vertical Wear Liner Stainless Steel welded Horizontal: Manganese	ASF Open Market
8	Stabilizers Motion Control	ASF
9	Truck Springs 3-11/16" travel	SCT
10	Truck Side Bearing Constant Contact Long Travel 4500 LT	ASF
11	Brake Beam AAR No. 24, Series 2000	Miner
12	Brake Beam Wear Plate Non-metallic, ZT-1696-B	ZefTek
13	Brake Shoes 2", Tread Guard, Day One	RRFP
14	Brake Shoe Keys Forged Steel	SCT
15	Roller Bearing Retainer Keys Forged Steel	Schaefer
16	Center Pins AAR 2" diameter	Open Market
17	Truck Brake Levers Forged	Schaefer
18	Exterior Paint Graphite, 62-11669 Thermalbond	Williams-Hayward
19	Defect Card Holder One (1), AAR Standard	Open Market
20	Route Card Holder Aluminum	Open Market
21	Uncoupling Levers "A" End "B" End Single Lever "Bail" Type Single Lever Standard Type	Stanrail Stanrail



ITEM	DESCRIPTION		SUPPLIER
22	Brake System	ABDX Conventional Body, Aluminum SSPB	Wabtec
23	Empty/Load Device	Slope Sheet Mount, 40%	Wabtec
24	Slack Adjuster	AAR automatic, double acting	Universal/Wabtec
25	Handbrake	Vertical Wheel Group "N", Long Handle	Universal/Wabtec
26	Brake Badge	Stainless Steel, with lever and rod lengths	Open Market
27	Brake Cylinder	10" x 12"	Wabtec
28	Air Line and Brake Hoses	33"	Strato
29	Hose Supports	none	
30	Couplers "A" End "B" End	Type "F" Rotary with anti-gravity lock Type "F" Fixed with anti-gravity lock	ASF ASF
31	Draft Gear, Yokes & Follower Block	Twin-Pack	ASF
32	Coupler Carrier Wear Plate	Manganese	Open Market
33	Cast Draft Sill	Gr. "B+" Cast Steel with 15-7/8" Center Plate	ASF
34	Knuckle Pin	Non-Metallic, ZT-2075	ZefTek
35	A.E.I. Tag	(2) High-Temperature	Open Market
36	Delineators	Horizontal, Yellow	3M
37	End Platforms	Galvanized Steel, 8" x 60", both ends	Morton
38	Spool Valve		Lexaire
39	Air Cylinder	14" with fiberglass barrel	Rexroth
40	Air Tank	30-Gallon	Open Market
41	Air Filter	Screw-on Housing	Monnier 92-271
42	Isolation Valve	¾"	Open Market
43	Check Valve	¾"	Open Market
44	Quick Exhaust Valve	¾"	Open Market
45	Drain Valve	½"	Open Market
46	Doors, Linkages and Operating Beams		Trinity

## **7.0 DOCUMENTATION**

### **7.1 FRA RULES COMPLIANCE REVIEW REQUEST**

A letter and applicable drawings depicting the safety appliances, brake force diagram and reflectorization arrangement will be sent to the Federal Railroad Administration (FRA), Office of Safety Assurance and Compliance, Motive Power and Equipment Division, requesting review for compliance with FRA rules in effect at the time of receipt of order. A copy of the FRA submittal and any reply will be available for the customer.

### **7.2 CLOSE OUT DOCUMENTATION**

TrinityRail will furnish a standard Compact Disc (CD) containing:

1. Drawings of ALL assemblies and arrangements in TIFF format. The drawing file names are to be the same as the drawing number.
2. A parts list, containing all drawing numbers with revision level, and all purchased specialty components in PDF format.
3. The as built Product Specification in PDF format.
4. Specialty Supplier's Installation Certifications in PDF format, if applicable.
5. Air brake and curve tests in PDF format, if applicable.
6. Meeting minutes from Mechanical Conference and Sample Car, if applicable.
7. Photographs of the production cars in JPEG format. Seven total photographs as detailed below:
  - Right side elevation
  - Left side elevation
  - Three-quarter view
  - "A" end
  - "B" end
  - Top view
  - Interior