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### BOILER SPECIFICATION CARD

**Locomotive No.** \_\_\_\_\_ ; **Boiler No.** \_\_\_\_\_ ; **Date built** \_\_\_\_\_  
**Boiler built by:** \_\_\_\_\_  
**Owned by:** \_\_\_\_\_  
**Operated by:** \_\_\_\_\_  
**Type of boiler:** \_\_\_\_\_ ; **Dome, where located:** \_\_\_\_\_

### BOILER SURVEY DATA

Where **condition** is called for, use: **New** - New material at the time of the boiler survey; **Good** - Little or no wear and/or corrosion; **Fair** - Obvious wear and/or corrosion.

#### Boiler Shell Sheets

Material:	Type of Material <small>(wrought iron, carbon steel, or alloy steel)</small>	Carbon Content	Condition
1st course (front)	_____	_____	_____
2nd course	_____	_____	_____
3rd course	_____	_____	_____
Rivets	_____	n/a	n/a

**Documentation of how material was determined shall be attached to this form.**

Measurements:	At Seam	Thinnest		
Front flue sheet, thickness	n/a	_____	,ID _____	,ID _____
1st course, thickness	_____	_____	,ID _____	,ID _____
2nd course, thickness	_____	_____	,ID _____	,ID _____
3rd course, thickness	_____	_____	,ID _____	,ID _____

**When courses are not cylindrical give ID at each end**

**Is boiler shell circular at all points?** \_\_\_\_\_  
 If shell is flattened, state location and mount \_\_\_\_\_  
 Are all flattened areas of shell stayed adequately for the pressure allowed by this form? \_\_\_\_\_

**Water Space at Mud Ring:** Sides \_\_\_\_\_, Front \_\_\_\_\_, Back \_\_\_\_\_  
**Width of water space at sides of fire box measured at center line of boiler:** Front \_\_\_\_\_, Back \_\_\_\_\_

#### Firebox and Wrapper Sheets

Firebox sheets:	Thickness	Material	Condition
Rear flue sheet	_____	_____	_____
Crown	_____	_____	_____
Sides	_____	_____	_____
Door	_____	_____	_____
Combustion chamber	_____	_____	_____
Inside throat	_____	_____	_____

**Wrapper sheets:**

Throat	_____	_____	_____
Back head	_____	_____	_____
Roof	_____	_____	_____
Sides	_____	_____	_____

**Steam Dome**

Dome is made of \_\_\_\_\_ pieces (not including seam welts, if any), Top opening diameter \_\_\_\_\_  
 Middle cylindrical portion - ID \_\_\_\_\_, Opening in boiler shell, longitudinally - \_\_\_\_\_

<b>Dome sheets:</b>	Thickness	Material	Condition
Base	_____	_____	_____
Middle cylindrical portion	_____	_____	_____
Top	_____	_____	_____
Lid	_____	_____	_____

**Boiler shell liner for steam dome opening:**

Is liner part of longitudinal seam? \_\_\_\_\_

**Arch Tubes, Flues, Circulators, Thermic Siphons, Water Bar Tubes, Superheaters, and Dry Pipe**

**Arch tubes:** OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; conditions \_\_\_\_\_

**Flues:**

OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_  
 OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_  
 OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

**Circulators:** OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; conditions \_\_\_\_\_

**Thermic siphons:** number \_\_\_\_\_; Plate thickness \_\_\_\_\_; condition \_\_\_\_\_  
 Neck OD \_\_\_\_\_, neck thickness \_\_\_\_\_; condition \_\_\_\_\_

**Water bar tubes:** OD \_\_\_\_\_, wall thickness \_\_\_\_\_

**Superheater units directly connected to boiler with no intervening valve:**

Type \_\_\_\_\_, Tube OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

**Dry pipe subject to pressure:**

OD \_\_\_\_\_, wall thickness \_\_\_\_\_, material \_\_\_\_\_; condition \_\_\_\_\_

### Stay Bolts, Crown Bar Rivets, and Braces

**Stay bolts:**

Smallest crown stay diameter \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
 Smallest stay bolt diameter \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
 Smallest combustion chamber stay bolt diameter \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
**Measurement at smallest diameter**

**Crown bar bolts & rivets:**

Roof sheet rivets, smallest dia. \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
 Roof sheet bolts, smallest dia. \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
 Crown sheet rivets, smallest dia. \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_  
 Crown sheet bolts, smallest dia. \_\_\_\_\_ ,avg. spacing \_\_\_\_\_ X \_\_\_\_\_ ;condition \_\_\_\_\_

**Braces:**

Total Cross Sectional Area of Braces

	Number	Total Area Stayed	Actual	Equivalent Direct Stay
Backhead	_____	_____	_____	_____
Throat sheet	_____	_____	_____	_____
Front tube sheet	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

### Safety Valves, Heating Surface, and Grate Area

**Safety valves:** Total number of safety valves on locomotive \_\_\_\_\_

Valve Size	Manufacturer	No. valves of this size and manufacture
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**Heating Surface:**

Heating surface, as part of a circulating system in contact on one side with water or wet steam being heated and on the other side with gas or refractory being cooled, shall be measured on the side receiving heat.

Firebox and Combustion Chamber	_____	square feet
Flue Sheets (less flue ID areas)	_____	square feet
Flues	_____	square feet
Circulators	_____	square feet
Arch Tubes	_____	square feet
Thermic Siphons	_____	square feet
Water Bar Tubes	_____	square feet
Superheaters (front end throttle only)	_____	square feet
Other	_____	square feet
<b>Total Heating Surface</b>	_____	square feet

**Grate area:** \_\_\_\_\_ square feet

## Water Level Indicators, Fusible Plugs, and Low Water Alarms

Height of lowest reading of gauge glasses above crown sheet: \_\_\_\_\_

Height of lowest reading of gauge cocks above crown sheet: \_\_\_\_\_

Is boiler equipped with fusible plug(s)? \_\_\_\_\_, number \_\_\_\_\_

Is boiler equipped with low water alarm(s)? \_\_\_\_\_, number \_\_\_\_\_

### Calculations

**Staybolt stresses:**

Stay bolt under greatest load, maximum stress \_\_\_\_\_ psi

Location \_\_\_\_\_

Crown stay, crown bar rivet, or crown bar bolt under greatest load, max. stress \_\_\_\_\_ psi

Location \_\_\_\_\_

Combustion chamber stay bolt under greatest load, maximum stress \_\_\_\_\_ psi

Location \_\_\_\_\_

**Braces:**

Round or rectangular brace under greatest load, maximum stress \_\_\_\_\_ psi

Location \_\_\_\_\_

Gusset brace under greatest load, maximum stress \_\_\_\_\_ psi

Location \_\_\_\_\_

**Shearing stress on rivets:**

Greatest shear stress on rivets in longitudinal seam \_\_\_\_\_ psi

Location (course #) \_\_\_\_\_ ; Seam Efficiency \_\_\_\_\_

**Boiler shell plate tension:**

Greatest tension on net section of plate in longitudinal seam \_\_\_\_\_ psi

Location (course #) \_\_\_\_\_ ; Seam Efficiency \_\_\_\_\_

**Boiler plate and components, minimum thickness required @ tensile strength:**

Front tube sheet	_____	@	_____	Rear flue sheet	_____	@	_____
1st course at seam	_____	@	_____	1st course not at seam	_____	@	_____
2nd course at seam	_____	@	_____	2nd course not at seam	_____	@	_____
3rd course at seam	_____	@	_____	3rd course not at seam	_____	@	_____
Roof sheet	_____	@	_____	Crown sheet	_____	@	_____
Side wrapper sheets	_____	@	_____	Firebox side sheets	_____	@	_____
Back head	_____	@	_____	Door sheet	_____	@	_____
Throat sheet	_____	@	_____	Inside throat sheet	_____	@	_____
Combustion chamber	_____	@	_____	Dome, top	_____	@	_____
Dome, middle	_____	@	_____	Dome, base	_____	@	_____
Arch tubes	_____	@	_____	Dome, lid	_____	@	_____
Water bar tubes	_____	@	_____	Thermic siphons	_____	@	_____

Dry pipe \_\_\_\_\_ @ \_\_\_\_\_ Circulators \_\_\_\_\_ @ \_\_\_\_\_

- Notes. 1. If tensile strength used is greater than 50,000 psi for steel or greater than 45,000 psi for wrought iron, supporting documentation must be furnished.
- 2. Any shell dimension less than 1/4" in thickness may not be adequate for support of or by other structures, particularly where threads or staybolts are concerned. Applicable codes should be consulted.

**Boiler Steam Generating Capacity:** \_\_\_\_\_ pounds per hour

The following may be used as a guide for estimating steaming capacity:

Pounds of Steam Per Hour Per Square Foot of Heating Surface:	
Hand fired	8 lbs. per hr.
Stoker fired	10 lbs. per hr.
Oil, gas or pulverized fuel fired	14 lbs. per hr.

**Record of Alterations**

Description of Alteration	Date of Alteration
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

**Record of Waivers**

Waiver No.	Section No. Affected	Scope and Content of Waiver
_____	_____	_____
_____	_____	_____
_____	_____	_____


Calculations done by: \_\_\_\_\_; Verified by: \_\_\_\_\_

Data used to verify the foregoing specifications is current and accurate. Based upon the information contained in this document and all necessary calculations, this boiler of Locomotive (Initial & number) \_\_\_\_\_ is safe for a working pressure of \_\_\_\_\_ psi.

\_\_\_\_\_ Date \_\_\_\_\_; \_\_\_\_\_ Date \_\_\_\_\_

**Locomotive Owner**

**Locomotive Operator**

Make working sketch here or attach drawing of longitudinal and circumferential seams used in shell of boiler, indicating on which courses used and give calculated efficiency of weakest longitudinal seam.