

KANSAS ANTIQUE ENGINE SHOW SAFETY ASSOCIATION

APPENDIX 3 BOILER INSPECTION CHECKLIST

Revision 1 March 2001

OWNER _____
MAKE _____ YEAR _____
KAESSA # _____ NBIC # _____
HEATING SURFACE _____ DESIGN PRESSURE _____
MAXIMUM ALLOWABLE WORKING PRESSURE _____
INSPECTOR _____ DATE _____

SMOKEBOX

- Front tube sheet (condition of sheet and thickness around hand hole openings) (condition of threaded openings and plugs) (condition of rivets between sheet and shell)
- Tubes (are tubes properly beaded?) (are there signs of leakage?)
- Shell (condition of shell, particularly around lower surfaces)
- Interior (condition of interior of smokebox) (check outside of tubes)
- Tube sheet (check back side of tube sheet, especially area in contact with hand hole gasket and area where tube sheet joins barrel)
- Tube sheet supports (through stays, supports or strong-backs)
- Interior rivet tails on lap or strap joints
- Bolster (check front axle attach points inside and outside)

BARREL

- Tube sheet attachment (check condition of rivets of tube sheets)
- Openings (check condition of threaded openings and plugs) (check plumbing openings into shell, feedwater nozzle, injector nozzle, steam take-off, water column, etc.) (verify three full threads engagement)
- Radius rod (check condition of radius rod attachment)
- Attachments (check attachment points of studs, castings, brackets, and any other accessories)
- Hand hole (check thickness and interior and exterior mating surfaces)
- Lap seam or Butt strap (check for leaking around seams or joint rivets) (verify joint efficiency for calculations)
- Contour (check for abnormal barrel contour)
- Jacket (does jacket cover any critical areas or make them difficult to observe?) (is barrel pitted or corroded under jacket?)

WRAPPER SHEET

- Hand hole (check thickness and interior and exterior mating surfaces)
- Leakage (check for seeping around attachment points of wing sheets, axle supports, etc.) (check for seeping around stay bolts)

- [] Seams (check condition of wrapper to throat sheet and rear head seam) (check condition of throat sheet to barrel seam)
- [] Contour (check for abnormal wrapper contour)
- [] Openings (check condition of threaded openings and plugs) (check plumbing openings into shell, steam take-off, water column, etc.) (verify three full threads engagement)
- [] Internal surfaces (check for cracks, pits, corrosion, material thickness)
- [] Staybolt (check for staybolt diameter, condition of heads, corrosion, and seepage) (welded over heads are not acceptable)
- [] Water legs (check for scale and mud accumulation) (check for accumulation of dirt or grease between or behind attaching brackets such as wing sheets)
- [] Blowdown valve (check for presence of and proper type of blowdown valve) (does blowdown valve require a plug during demonstrations because of easy access by public?)
- [] Differences between wet-bottom and mud-ring type boilers
 - Dry bottom- observe seams at bottom of water legs in ash pan
is ash pan and grate removal required?
check condition of grate support brackets
 - Wet bottom- check ash pan area for pits and stay bolt condition
check inside of bottom of wrapper and stay bolts
check condition of lap seam in wrapper
check condition of ash pan drain tube, if present

DOMES

- [] Drains (check for drainback holes in shell, usually applies to models)
- [] Main shutoff valve (check condition of main shutoff valve)
- [] Plumbing (check condition of plumbing on main steam line and any devices on dome)
- [] Dome saddle (check condition of dome seams and seams between dome and boiler shell) (is seepage present?) (can interior seams be observed?)
- [] Pressure gage (check that the siphon is present and in good condition) (verify that the gage has been calibrated using a dead weight tester or checked against an approved calibrated test gage or another standard gage) (verify that the gage is readable from the operator's position) (check that there is no valve in the gage line except a cock near gage with a handle parallel to pipe when open)
- [] Safety valve (verify that it is an ASME Code V or VR valve rated for the required flow capacity and set and marked for the correct MAWP, with trip lever and proper seal) (verify that the safety valve has a dedicated steam line with no other valves or attachments) (verify that the valve is located as close as practical to the boiler with no line reduction less than the valve inlet) (check that the outlet is not plumbed nor obstructed) (check that the valve is mounted vertically) (for limited size boilers where an ASME valve cannot be purchased, a Chief Inspector's approval is required)
- [] Whistle (check the steam line and valve to the whistle)

WATER LEVEL

- [] Water glass (is water glass calibrated to the level of the crown sheet? This can only be done when the crown sheet and soft plug can be seen and measured) (check the condition of the glass, cracks or scratches?) (check for leaks around glass gaskets)
- Recommended minimum water level may be determined as follows: with engine setting on level ground and water just observable at the bottom of the glass, the crown sheet should be covered by a minimum of 2½ inches on a full scale boiler, by a minimum of 1½ inches on a half scale boiler, and by a minimum of 1 inch on a quarter scale boiler.
- [] Try cocks (check the condition of the try cock valves and water glass or water column blow-down valve) (verify that trycocks are operational)

FIREBOX

- [] Firebox form (check for bulges or abnormal shapes) (check firebox sides for excessive warping or blistering)
- [] Crown sheet (check condition and design of crown sheet) (it should not be able to trap water)
- [] Seams (check seams around door)
- [] Sediment (inspect for sediment over firedoor opening in the rear head) (check for sediment buildup over peephole opening in wrapper sheet)
- [] Fusible plug (remove fusible plug to verify that it is an ASME plug) (check the top surface and clean scale) (check the crown sheet thickness at the plug location and the condition of the threads) (check that plug protrudes one inch minimum into the water side or one inch maximum into the fire side, as applicable) (for limited size boilers where an ASME fusible plug cannot be purchased, a Chief Inspector's approval is required)
- [] Staybolts (observe all staybolts for condition, especially near the top surface of the crown sheet) (check staybolt heads inside fire box) (check staybolt diameter and corrosion) (welded over heads are not acceptable)
- [] Stays and bracing (observe through stays, strong-backs, knee braces, gusset braces, etc)
- [] Hand hole (check thickness and interior and exterior mating surfaces)
- [] Openings (check condition of threaded openings and plugs) (check plumbing openings into rear head, steam take-off, water column, etc.)
- [] Rear tube sheet (check condition of rear sheet and tubes)

EXTERNAL PLUMBING

- [] Black pipe (black pipe, and plugs are required to be used throughout on pressure lines, galvanized may be used on water lines) (schedule 80 ASME tested pipe and fittings are required between the boiler and the first valve) (check that the installation year is stamped or stenciled on the schedule 80 pipe) (20 year life allowed on new Sch 80 piping and fittings)
- [] Plugs (remove plugs in the boiler to inspect and check thread condition) (check that the installation year is marked as described above)
- [] Fittings (check that all fittings are of proper pressure rating for the rated MAWP)

- [] Water sources (verify that two separate feedwater systems are present and in operable condition) (is feedwater heater operable?)
- [] Isolation valves (check that isolation valves are present to shut off individual system lines)
- [] Plumbing (check that support brackets and bracing is present where needed) (check piping for condition and for freeze damage)
- [] Pressure gage (check that pressure gage has 1½ MAWP working range) (check that a siphon is installed) (verify that gage is certified or tested annually) (check that a valve cock indicates "open" position or that valve is wired open)

HYDROSTATIC PRESSURE TEST

- [] Hydrostatic pressure test is required each year at 100% to 125% of MAWP using water at a temperature of 60° to 120° F. An accurate gage should be used and the pressure should be held as long as is necessary to perform the inspection. Internal and external inspection is required every year. Adequate and sufficient size inspection openings are required on all boilers.

ULTRASONIC THICKNESS MEASUREMENT

- [] An ultrasonic thickness survey shall be done on the boiler every fifth year as a minimum, but the inspector may require it more frequently. For boilers stored outside, an ultrasonic, test is required every year. As necessary, MAWP shall be re-calculated based on thickness measurements.

GENERAL

As of March 2001, KAERSSA Bylaw #31 incorporates the Boiler Safety Rules and Regulations as requirements for boilers, Operators, Inspectors and boiler inspections. The Rules and Regulations take precedence over this checklist. Every boiler shall be identified with the KAERSSA two letter prefix and assigned number stamped on the boiler or on an attached plate as well as on the annual inspection report. All operators shall display the current Boiler Inspection Certificate on or close to the engine. All operators shall have a KAERSSA operator's license. All repairs to a boiler concerning material selection and procedures shall be approved before repairs are implemented.

Hand tube fired boilers are assumed to generate 5 lb/hr of steam per square foot of heating surface for purposes of safety valve capacity.