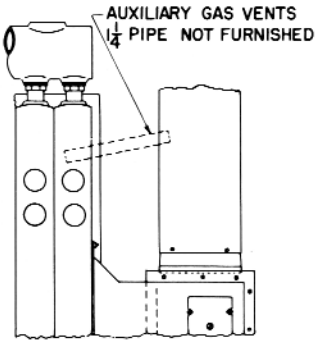
Smith
CAST IRON BOILERS


# Mills 3500A

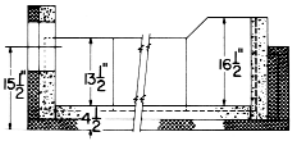
**OIL, GAS OR COMBINATION GAS/LIGHT OIL COMMERCIAL BOILER/BURNER**

THE HEATING Pros

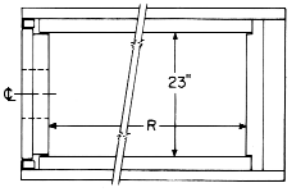



SIDE VIEW - GAS FIRED

## COMBUSTION CHAMBER DETAILS



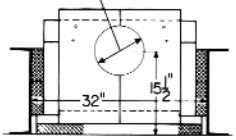

SECTION




PLAN VIEW

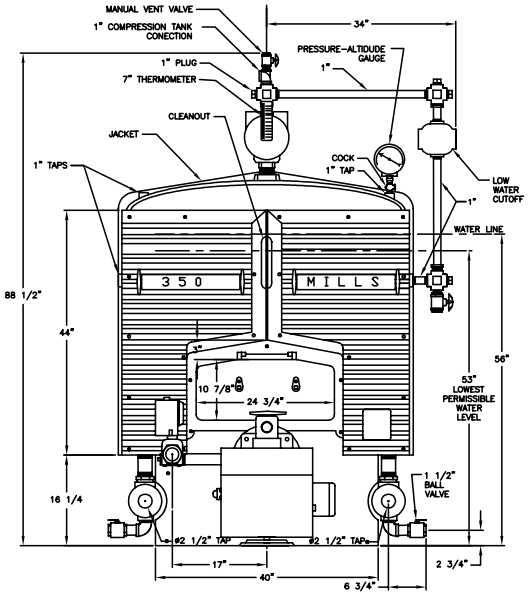
CARLIN
6-11 SECT. — 9"
12-14 SECT. — 10½"

POWERFLAME
6-10 SECT. — 9"
11-14 SECT. — 10½"

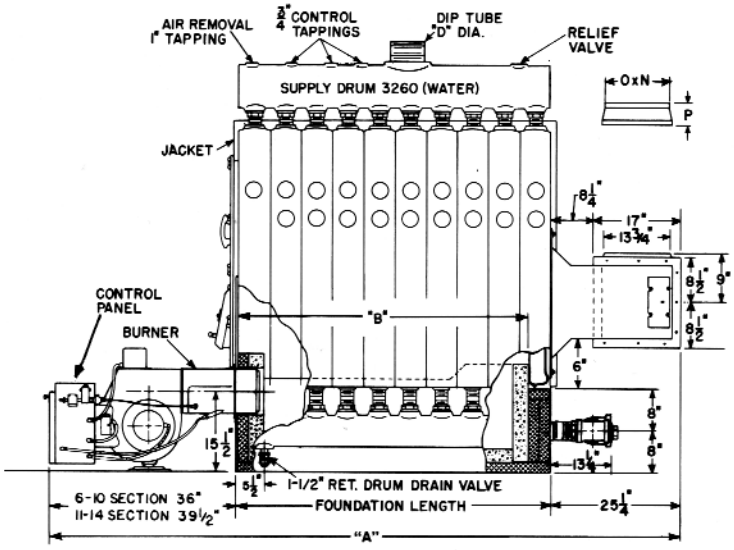



FRONT VIEW

| NO. OF SECT | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|
| R INCHES | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |




FRONT VIEW - WATER




SIDE VIEW - NATURAL DRAFT - WATER - POWERFLAME

# I=B=R RATINGS, BURNER CAPACITIES, DRAFT and CHIMNEY DATA

| BOILER MODEL NUMBER | Boiler Horse-power | I=B=R Gross Output (MBH) | NET I=B=R RATINGS | | | I=B=R Burner Capacity | | I=B=R Combustion Efficiency (%) | | Draft Requirements (Inches, W.C.) | | | Natural Draft Chimney | | Inside Dimen-sions Rec-tangular Smokepipe to Fit Smokehood Outlet (Ins.) | Induced Draft Fan Capacity CMF (Wing & Auburn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Steam | | Water | | | | | | | | | | | |
| | | | Sq. Ft. | MBH (Note 1) | MBH (Note 2) | Oil GPH (Note 3) | Gas MBH | Oil | Gas | Over Fire | Draft Loss | Total | Size (Inches) | Height (Feet) (Note 4) | | |
| †3500A-▲-6 | 34.8 | 1165 | 3642 | 874 | 1013 | 10.4 | 1499 | 83.2 | 80.7 | .02 | .06 | .08 | 16x16 | 19 | 14x14 | 575 |
| †3500A-▲-7 | 44.2 | 1478 | 4696 | 1127 | 1285 | 13.0 | 1889 | 83.2 | 80.7 | .02 | .08 | .10 | 16x20 | 23 | 14x16 | 713 |
| †3500A-▲-8 | 53.5 | 1790 | 5771 | 1385 | 1557 | 15.8 | 2278 | 83.3 | 80.8 | .02 | .09 | .11 | 20x20 | 26 | 14x18 | 851 |
| †3500A-▲-9 | 62.8 | 2103 | 6804 | 1633 | 1829 | 18.4 | 2668 | 83.3 | 80.8 | .02 | .11 | .13 | 20x20 | 30 | 14x18 | 990 |
| †3500A-▲-10 | 72.1 | 2415 | 7813 | 1875 | 2100 | 21.0 | 3057 | 83.3 | 80.8 | .02 | .12 | .14 | 20x20 | 33 | 14x18 | 1,117 |
| †3500A-▲-11 | 81.5 | 2727 | 8821 | 2117 | 2371 | 24.0 | 3447 | 83.3 | 80.8 | .02 | .14 | .16 | 20x24 | 37 | 14x20 | 1,250 |
| †3500A-▲-12 | 90.8 | 3040 | 9833 | 2360 | 2643 | 26.5 | 3836 | 83.3 | 80.8 | .02 | .16 | .18 | 20x24 | 40 | 14x20 | 1,383 |
| †3500A-▲-13 | 100.1 | 3352 | 10842 | 2602 | 2915 | 29.5 | 4226 | 83.3 | 80.8 | .02 | .17 | .19 | 24x24 | 44 | 14x20 | 1,516 |
| †3500A-▲-14 | 109.5 | 3665 | 11854 | 2845 | 3187 | 32.0 | 4615 | 83.3 | 80.8 | .02 | .19 | .21 | 24x24 | 47 | 14x20 | 1,676 |

† Insert "LO" for Light Oil, "G" for Gas, "G/O" for Gas/Oil.

▲ Insert "S" for Steam, "W" for Water.

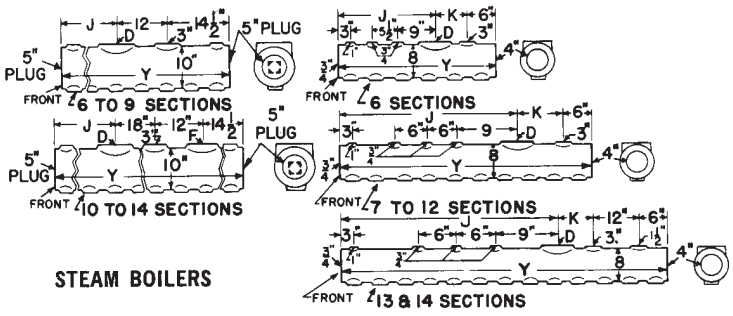
Note 1 Net I=B=R Steam ratings shown are based on piping and pick-up allowances of 1.288 except for 6 Section (1.333), 7 Section (1.333) and 8 Section (1.292).

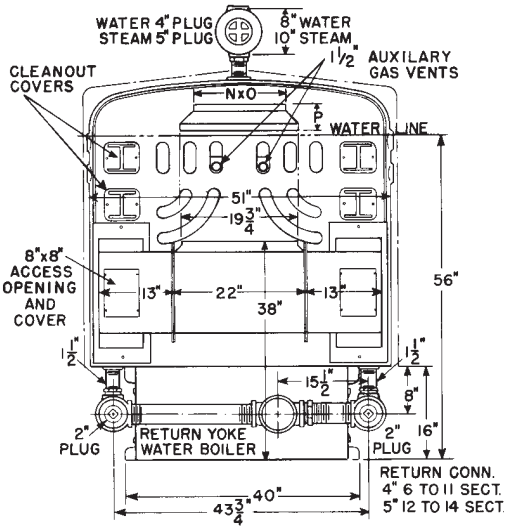
Note 2 Net I=B=R Water Ratings shown are based on an allowance of 1.15.

Note 3 Based on Light Oil having a heat content of 140,000 Btu/Gal.

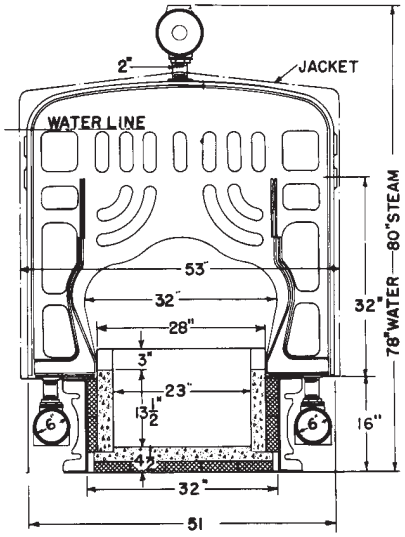
# MILLS 3500A QUICK RESPONSE BOILER-BURNER

## SUPPLY DRUMS

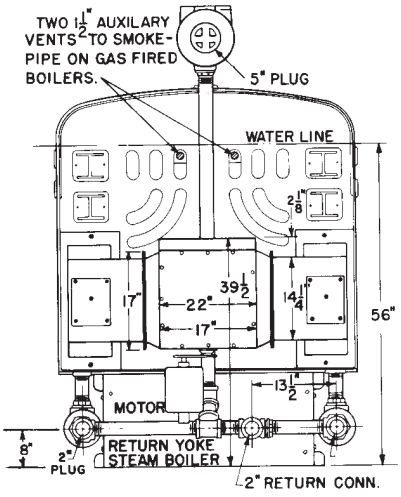



REAR VIEW - NATURAL DRAFT - WATER




INTERMEDIATE SECTION




REAR VIEW WING FAN

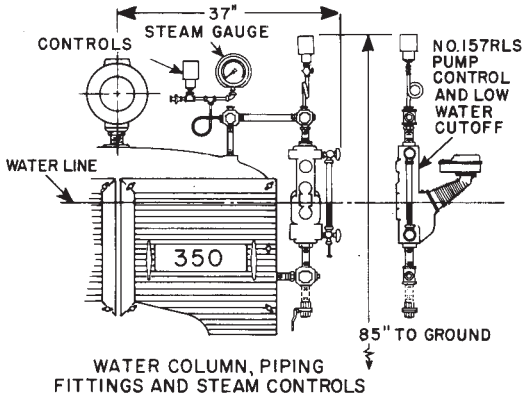
Designed and tested according to the A.S.M.E. boiler and pressure vessel code. Section IV for maximum allowable working pressure. Steam 15 lbs.. Water 40 lbs.For 80 psi working pressure consult Smith.

| BOILER MODEL NUMBER | Induced Draft Fan Catalog Number (Note 5) | | Induced Draft Chimney, Inside Dimensions | | | Heating Surface (Sq. Ft.) | Furnace Volume (Cu. Ft.) (Note 6) | Water Content (Gallons) | | Weight (Lbs.) (Note 7) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Metal Flue Pipe or Smooth Lined Masonry (In.) | | Unlined Brick (Nom. Inches) | | | | | |
| | Wing Fan to Fit Smoke-hood | Auburn Fan and Smoke-hood to Fit Boiler | Round (I.D.) Min. | Rectangular Minimum | Rectangular Minimum | | | Steam | Water | |
| †3500A-▲-6 | 14D-1/4 | 12A25 | 13 | 9 1/2 x 13 1/2 | 12 x 16 | 168.4 | 16.43 | 68.5 | 107.0 | 4,755 |
| †3500A-▲-7 | 14D-1/4 | 12A25 | 13 | 9 1/2 x 13 1/2 | 12 x 16 | 197.6 | 19.67 | 79.0 | 123.0 | 5,285 |
| †3500A-▲-8 | 14D-1/4 | 12A33 | 14 | 13 1/4 x 13 1/4 | 16 x 16 | 226.4 | 22.91 | 89.0 | 139.5 | 5,910 |
| †3500A-▲-9 | 14D-1/3 | 12A33 | 15 | 13 x 17 | 16 x 20 | 255.6 | 26.15 | 99.5 | 156.0 | 6,575 |
| †3500A-▲-10 | 14D-1/3 | 12A50 | 16 | 13 x 17 | 16 x 20 | 284.8 | 29.39 | 110.0 | 172.0 | 7,300 |
| †3500A-▲-11 | 14D-1/2 | 12A50 | 17 | 16 3/4 x 16 3/4 | 20 x 20 | 313.6 | 32.64 | 120.0 | 188.0 | 7,880 |
| †3500A-▲-12 | 14D-1/2 | 14A50 | 17 | 16 3/4 x 16 3/4 | 20 x 20 | 342.8 | 35.88 | 130.0 | 204.5 | 8,475 |
| †3500A-▲-13 | 14D-3/4 | 14A75 | 18 | 16 1/2 x 20 1/2 | 20 x 24 | 371.6 | 39.12 | 140.5 | 221.0 | 9,130 |
| †3500A-▲-14 | 14D-3/4 | 14A75 | 18 | 16 1/2 x 20 1/2 | 20 x 24 | 400.8 | 42.36 | 151.0 | 237.0 | 9,705 |

## Oil - Gas or Combination Gas/Light Oil

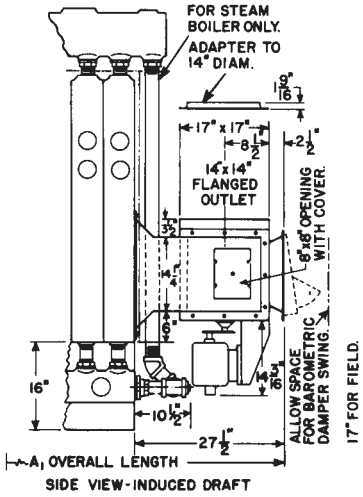
**I=B=R Ratings**
**Gross Output**
**1,165 to 3,665 MBH**

Note 4 Chimney height shall be sufficient to avoid creating a nuisance. See chart, "Induced Draft Chimney" for inside dimensions.
Note 5 The induced draft fan selections listed are based on a chimney capable of offsetting the friction in the fan discharge connection. For other conditions, consult your Smith representative.
Note 6 Includes the volume of the precast combustion chamber.
Note 7 Includes boiler castings, trim, draft inducer, combustion chamber and jacket. To obtain gross operating weight, add weight of water.



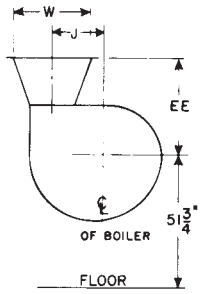

WATER COLUMN, PIPING
FITTINGS AND STEAM CONTROLS

## WCATER COLUMN, PIPING, FITTINGS AND STEAM CONTROLS

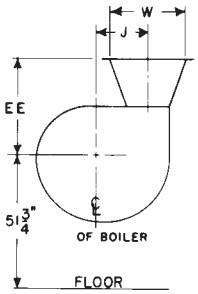



## SIDE VIEW WING FAN

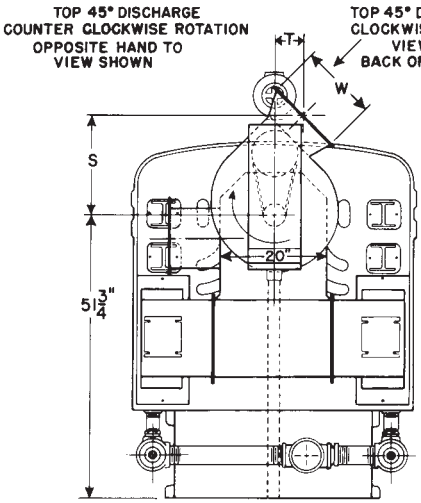
## OPTIONAL DISCHARGE POSITIONS AUBURN INDUCED FAN



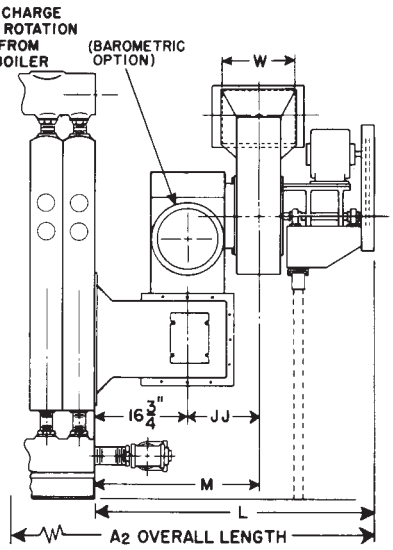

**TOP VERTICAL DISCHARGE CLOCKWISE ROTATION**
(This view as seen from back of boiler)




**TOP VERTICAL DISCHARGE COUNTERCLOCKWISE ROTATION**
(This view as seen from back of boiler)




## REAR VIEW AUBURN FAN




## SIDE VIEW AUBURN FAN

# DIMENSIONS, ELECTRICAL REQUIREMENTS - MILLS 3500A

| Overall length (Inches) All Models | | | Furnace Length (Inches) | Foundation Length (Inches) | Water Supply Drum | | | | Steam Supply Drum | | | | Smokehood Outlet Adapter (Inches) Natural Draft | | | Auburn Fan Dimensions (Inches) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tapping Size (Inches) | Tapping Location (Inches) | | | Tapping Size (Inches) | | Tapping Location (Inches) | | | | | | | | | | | |
| Natural Draft | Wing Fan | Auburn Fan | | | | | | | | | | | | | | | | | | | | |
| A | A1 | A2 | B | | D | J | K | Y | D | F | J | Y | N | O | P | J | L | M | S | T | W | EE | JJ |
| 97 3/4 | 117 | 119 1/2 | 32 1/4 | 36 1/2 | 4 | 21 | 9 | 36 | 6 | - | 15 | 41 1/2 | 137/8 | 137/8 | 41/4 | | | | | | | | |
| 103 3/4 | 123 | 125 1/2 | 38 1/4 | 42 1/2 | 4 | 27 | 9 | 42 | 6 | - | 21 | 47 1/2 | 157/8 | 137/8 | 31/4 | | | | | | | | |
| 109 3/4 | 129 | 131 1/2 | 44 1/4 | 48 1/2 | 4 | 27 | 15 | 48 | 6 | - | 27 | 53 1/2 | 177/8 | 137/8 | 21/4 | | | | | | | | |
| | | | | | | | | | | | | | | | | 81/2 | 47 | 29 3/4 | 17 1/4 | 5 1/4 | 12 | 16 | 12 1/4 |
| 115 3/4 | 135 | 137 1/2 | 50 1/4 | 54 1/2 | 4 | 33 | 15 | 54 | 6 | - | 33 | 59 1/2 | 177/8 | 137/8 | 21/4 | | | | | | | | |
| 121 3/4 | 143 3/4 | 147 1/4 | 56 1/4 | 60 3/4 | 4 | 33 | 21 | 60 | 6 | 6 | 21 | 65 1/2 | 177/8 | 137/8 | 21/4 | | | | | | | | |
| 131 1/2 | 150 3/4 | 153 1/4 | 62 1/4 | 66 3/4 | 4 | 39 | 21 | 66 | 6 | 6 | 27 | 71 1/2 | - | - | - | | | | | | | | |
| 137 1/2 | 156 3/4 | 165 1/2 | 68 1/4 | 72 3/4 | 5 | 45 | 21 | 72 | 6 | 6 | 33 | 77 1/2 | - | - | - | | | | | | | | |
| 143 1/2 | 162 3/4 | 171 1/2 | 74 1/4 | 78 3/4 | 5 | 39 | 21 | 78 | 6 | 6 | 39 | 83 1/2 | - | - | - | 91/2 | 53 1/4 | 30 | 19 | 5 3/4 | 14 | 17 1/2 | 15 1/4 |
| 149 1/2 | 168 3/4 | 177 1/2 | 80 1/4 | 84 3/4 | 5 | 45 | 21 | 84 | 6 | 6 | 45 | 89 1/2 | - | - | - | | | | | | | | |

The manufacturer should be consulted before selecting a boiler having unusual piping and pick-up requirements, such as intermittent sys-tem operation, extensive piping, etc. For forced hot water heating systems where the boiler and all the piping are within the area to be heated, the boiler may be selected on the basis of gross output.

Note 8 Fractional horsepower motors are for operation with 115/230V, 60-Hz current at constant speed. Integral horsepower motors are for 230/460V, 60-Hz or 208V, 60-Hz current at constant speed.

Other voltages and variable speed options are available on special order.

# 3500A SPECIFICATIONS

## BURNERS

The forced draft flame retention burners for light oil, gas or gas-oil firing are U.L. certified and have been custom designed for optimum performance in each size 3500A unit.

All burners have prewired burner mounted con-trols with standard low fire start, high fire run and two position air control.

Burner specification sheet lists standard and optional burner components.

Burners can be furnished for lo-hi-lo and full modulation firing, and equipped with control systems to comply with most insurance and state or local code requirements.

## STANDARD EQUIPMENT

### *All Units*

- Foundation front plate completely cut and tapped.
- Insulated metal jacket.
- Pre-cast combustion chamber complete with insulating blocks.
- Return yoke with flexible seals.
- Two 1 1/2" drain valves with pipe and fittings.

### *Steam Units*

- Manual reset high-pressure limit control.
- Operating pressure control.
- Syphon, pipe tree for control mounting including inspector's gauge cock.
- ASME side-outlet safety valve set at 15 psi.
- Combination water column, low water cut-off and pump controller with piping.
- 4 1/2" pressure gauge.

### *Oil Units*

- Pressure-atomizing oil burner (low-high-off) fire-tested at the factory.
- Prewired burner-mounted controls.

### *Water Units*

- Manual reset high-temperature limit control.
- Operating temperature control.
- ASME relief valve set at 40 psi.
- Low water cut-off and piping. • Pressure-altitude gauge.
- Mercury column thermometer. • Dip tube.
- Air removal fitting. • Manual air vent valve.

### *Gas Units*

- Forced draft flame retention power burner.
- Prewired electronic burner-mounted control panel with numbered terminal strip (115V, 1 phase, 60 Hz control circuit).
- U.L. approved gas train.

### *Combination Gas/Oil Units*

- Forced draft pressure atomizing flame retention combination gas/oil burner.
- Prewired electronic burner mounted control panel with numbered terminal strip (115V, 1 phase, 60Hz control circuit).
- U.L. approved gas train.

## BURNER AND ELECTRICAL INFORMATION

| BOILER MODEL NUMBER | Burner Model Number | | | | Electrical Requirements | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carlin | Power-Flame | | | Burner Motor (HP) (Note 8) | | | | Induced Draft Fan Motor (HP) | |
| | Oil LO3500 | Oil LO3500 | Gas G3500 | Gas/ Oil GO3500 | Carlin | Power-Flame | | | | |
| | | | | | LO3500 | LO3500 | G3500 | GO3500 | Wing | Auburn |
| †3500A-▲-6 | 702CRD | C1-O | C1-G-12 | C1-GO-12 | 1/2 | 1/3 | 1/3 | 1/3 | 1/4 | 1/4 |
| †3500A-▲-7 | 702CRD | C2-OA | C2-G-15 | C2-GO-15 | 1/2 | 3/4 | 1/2 | 3/4 | 1/4 | 1/4 |
| †3500A-▲-8 | 801CRD | C2-OA | C2-G-20A | C2-GO-20A | 3/4 | 1 | 3/4 | 1 | 1/4 | 1/3 |
| †3500A-▲-9 | 801CRD | C2-OB | C2-G-20B | C2-GO-20B | 3/4 | 1 | 3/4 | 1 | 1/3 | 1/3 |
| †3500A-▲-10 | 1050FFD | C2-OB1 | C2-G-20B1 | C2-GO-20B1 | 1 | 1 | 3/4 | 1 | 1/3 | 1/2 |
| †3500A-▲-11 | 1050FFD | C3-O | C3-G-20 | C3-GO-20 | 1 | 2 | 1 1/2 | 2 | 1/2 | 1/2 |
| †3500A-▲-12 | 1150FFD | C3-O | C3-G-20 | C3-GO-20 | 1 1/2 | 2 | 1 1/2 | 2 | 1/2 | 1/2 |
| †3500A-▲-13 | 1150FFD | C3-O | C3-G-25 | C3-GO-25 | 1 1/2 | 2 | 1 1/2 | 2 | 3/4 | 3/4 |
| †3500A-▲-14 | 1150FFD | C3-O | C3-G-25 | C3-GO-25 | 1 1/2 | 2 | 1 1/2 | 2 | 3/4 | 3/4 |

† Insert "LO" for Light Oil, "G" for Gas, "G/O" for Gas/Oil.

▲ Insert "S" for Steam, "W" for Water.

# OPTIONAL EQUIPMENT

- Combination water feeder and low water cut-off. (Steam boilers only, piping not included).
- Field draft control for natural draft units in the following sizes: 12" (6 section), 14" (7 section), 16" (8-10 section) and 18" (11-14 section).
- Induced draft fan- Wing or Auburn. Fan systems are equipped with constant speed 1,750 rpm, 60-Hz motor. Adjustable pitch sheaves are used to achieve fan speed regulation.
- Draft control panel which includes magnetic starter, prepurge and draft safety switch and eight-point terminal block (1 phase) or 12-point terminal block (3 phase) installed and wired in panel box suitable for wall mounting. Red warning light (for low draft condition) in cover.
- Field draft controls with special mounting collars are available for Auburn and Wing fans.
- Start-up and one year's service.

# MAKE UP WATER FOR STEAM BOILERS

In modern automatic intermittently operating steam heating systems there regularly occurs a period of pickup during which the return of condensate from the system lags behind the evaporation of the boiler. The duration of this pickup period varies according to the physical characteristics of the system. It is generally agreed that average systems require from 15 to 30 minutes to achieve a balance between condensate return and evaporation. With modern fast steaming boilers, careful consideration of the provisions for makeup water must be given to insure the following operating results:

1. Maintain a safe, effective boiler water line.
2. Avoid the introduction of excessive amounts of raw makeup water.
3. Prevent nuisance burner shut-down because of temporary low water level.

In some localities standard practice for compact piping systems has consisted of providing an automatic water feeder to supply makeup water directly to the boiler according to drop in water level. This arrangement requires the introduction of raw makeup water during each pickup period and, in most instances, the excess system water must be drained manually at fre-quent intervals. Operation in this manner usually results in increased corrosion of system components and the consequent added maintenance. Some states and municipalities require a mechanical water feeder for all steam boilers to function as a safety feeder.. This feeder should be set to commence feeding when water level is approximately 1 inch above the bottom of the gauge glass but does not function as a principle source of makeup water.

Smith recommends a feed water system capable of satisfying the three previously listed requirements. It should include a condensate return unit consisting of at least one condensate pump sized to feed water to the boilers at a rate sufficient to maintain operating water level at full boiler rated output and a condensate receiver having sufficient storage capacity to provide for the oper-ation of the boiler during start-up of a cold system.

In the following schedule, the minimum recommended pumping rates and storage capacities for each 3500A Series boiler size are listed. For two boilers, the pumping rate and storage capacity should be doubled..

**SCHEDULE 1**

| No. of Boiler Sections | Minimum Pumping Rate GPM (1) | Minimum Receiver Capacity Gals. (2) (3) |
|---|---|---|
| 6 | 5 | 47 |
| 7 | 6 1/4 | 58 |
| 8 | 7 1/2 | 70 |
| 9 | 8 3/4 | 80 |
| 10 | 10 | 92 |
| 11 | 11 | 103 |
| 12 | 12 1/4 | 114 |
| 13 | 13 | 122 |
| 14 | 14 3/4 | 137 |

This schedule is based on the following:

1. Minimum recommended pumping rate is double the boiler evaporating rate at catalog rating.
2. Minimum storage capacity will provide 15 minutes of boiler operation at full rating using 80% of the receiver capacity without the addition of makeup water. Makeup water feeder should be set to commence feeding when receiver water level drops to 1/3 full.
3. The receiver capacities shown are considered adequate only for compact buildings. Receivers for extended build-ings require two or three times larger tanks depending upon the sizes, length and pitch of the piping.

For single boiler applications, the pump control-ler furnished with the boiler can be used to start and stop the condensate pump. For two or more boilers each pump controller should be wired to start and stop the pump and, in addition, a positive closing water level regulator or electric valve must be provided in the feed connection to each boiler. In all instances a manual fill connection to each boiler should be provided.

Smith does not furnish the condensate return units or water level regulators.

*In the interest of product improvement, Smith reserves the right to make changes without notice.*

Printed in U.S.A.

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