JUNE 1, 1998

### HOT WATER BOILER

#### GENERAL DESCRIPTION

Sellers' gas fired hot water heating boilers are ruggedly designed
for commercial and industrial
application in sizes from 10 to
700 HP. Key features of the design include long life, ease of
maintenance, high efficiency and
freedom from thermal shock. The
boilers are of a uniquely simple
design with horizontal single pass
fire tubes.

The power burner included is a forced draft premix type designed to attain high efficiencies. Premix burners easily achieve high CO<sub>2</sub> and low flue temperatures assuring peak efficiency. Combustion takes place as long thin flames inside the first half of each fire tube. High temperature radiant heat is widely distributed to over 50% of the heating surface. As a result, metal temperatures and

tube elongation are reduced, thermal stresses are lower and a long boiler tube life occurs.

The immersion fired system allows a strong and rugged pressure vessel to be designed. Since each tube is subjected to the same amount of heat, all tubes are at the same temperature. There are no hot furnace tubes opposing cooler convection tubes. With uniform tube temperatures, thermal stresses are equal over the entire tube bank so thermal shock problems are eliminated.

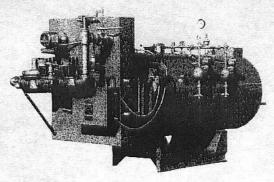
All heat transfer surfaces are water backed to reduce maintenance by ellminating refractories. Energy extractors in the rear half of each tube increase heat transfer to provide low flue gas temperatures.

#### PACKAGED UNITS

The boiler is completely factory assembled and mounted on a rugged steel skid for easy handling. Control and trim items are installed and factory checked for proper operation. Boiler is ready for connection of gas, water and electric services. Factory inspections include high pressure hydrostatic testing, high voltage wiring tests, and combustion analysis and testing. Sellers' boilers are approved as a package by Underwriters Laboratories.

#### **DESIGN FEATURES**

Sellers' boilers are built in accordance with the ASME Code and stamped with the ASME cloverleaf. Hot water boilers are built under Section IV of the Code for a design pressure of 100 psi and a maximum temperature of 250° F. Special higher pressure and temperature ratings are available upon request.



Both supply and return connections are located on the top centerline of the boller to simplify installation. Skid heights are only 12" to provide lower boilers for maximum boiler room overhead clearance.

Burner is hinge mounted for easy access. Most controls and components are industry standards to simplify maintenance. A rear relief door provides safe and easy access for cleaning. Handholes simplify inspection and cleaning. Manholes are provided as required by the Code.

#### BOILER SAFEGUARDS

Electronic flame safeguards control burner operations including automatic sequencing and flame monitoring.

Boiler operation is also monitored by a low water cutoff, an air switch to check combustion air pressure, a high limit temperature control and a pressure relief valve.

#### **OPERATING SEQUENCE**

On a call for heat by the temperature control, the water level and limits are checked for safety and the blower motor starts. The air supply is proved and the burner is prepurged for 30 seconds. After prepurge, the pilot gas valve opens and the gas is spark ignited. Spark is continuously maintained through the combustion cycle. After all runner pilots are proved within the 10 seconds allowed for ignition, the main gas valve opens. When the heat demand is satisfied, a 15 second post purge of the burner completes the cycle.

The RM7840 flame safeguard provides a safety shutdown within 3 second if flame failure occurs.

### HOT WATER BOILER RATINGS AND CAPACITIES

SEA LEVEL TO 3000 FEET ALTITUDE

HORSE	HOURLY	GROSS HOURLY	EDR GROSS	WATER C	APACITY	SHIPPING WEIGHT		
POWER	INPUT (1,000 BTU)	OUTPUT (1,000 BTU)	(150 Bluh/H)	Gallons	Pounds	100 PSI*	150 PSI	
10	419	335	2,233	149	1,254	2,440	2,440	
	629	502	3,350	149	1,254	2,450	2,450	
→ 20	837	670	4,465	147	1,236	2.500	2,500	
30	1,256	1,005	5,700	231	1,932	3,000	3,285	
40	1,674	1,340	8,935	224	1,876	3,160	3,440	
50	2,093	1,675	11,170	217	1,820	3,280	3,460	
60	2,512	2,010	13,40D	321	2,688	4,000	4,320	
80	3,348	2,680	17,870	308	2,576	4,280	4,350	
100	4.186	3,350	22,335	425	3,556	5,320	5,800	
125	5,231	4,185	27,900	408	3,416	5,620	6,160	
150	6,278	5,025	33,500	689	5,757	8,500	9,600	
200	8,370	6,700	44,670	863	7,208	10,560	11,910	
250	10,463	8,370	55,800	1,065	8,890	11,300	13,300	
300	12,555	10,050	67,000	1,024	8,548	11,900	13,900	
350	14,648	11,720	78,135	1,253	10,458	13,600	15,200	
400	16,740	13,400	89,335	1,502	12,541	15,400	17,900	
500	20,925	16,750	111,670	1,738	14,510	18,000	20,800	
600	25,110	20,100	134,000	1,998	16,679	21,500	24,600	
700	29,302	23,450	156,335	2,668	23,269	32,000	36,000	

<sup>&</sup>quot;Standard Boiler Pressure. ""Crating may add 500 pounds to some shipments.

#### GAS PRESSURE REGULATORS

Regulators are required on all gas trains. They are suppined at no exità charge provioning gas pressures to the regulator are within the standard gas train range shown in the chart below. If gas pressures exceed 10 psi, a second regulator should be supplied at the jobsite to reduce pressures to the standard range.

At elevations over 2000', consult the factory to determine if higher gas pressures are required.

Required Gas Pressures (Natural Gas at 0-2000' elevation)

100	Press	ure Required	ed at Inlet to Gas Train					
Boller	Standard	Gas Train	Special Gas Train*					
Horsepower	Minlmum	Maximum	Minimum	Maximum				
10 to 20	**8" w.c.	1 psi	"6" w.c.	10 psi				
30 to 80	12" w.c.	1 pši	**7" W.C.	10 psi				
100 to 125	14" w.c.	1 psi	"10" w.c.	10 psi				
150 to 200	18" w.c.	1 pal	14" w.c.	10 psi				
250	2 psi	10 psi	14" w.c.	10 psi				
300 to 400	1.5 psi	10 psl	14" w.c.	10 psi				
500 to 600	2.0 psi	10 psi	1 psi	10 psi				
700	3.0 psl	10 psi	1 psi	10 psi				

<sup>\*</sup>Special gas trains required at extra cost.
\*\*Minimum pressure for propane to be 11" w.c.

#### ELECTRICAL.

All boilers are factory assembled with 105° C color coded wire to numbered terminal strips. The wifing diagram is attached to the inside of the control panel cover. A transformer provides 5 amps at 120 volts to the control circuit. Motors are provided to match the specified power supply requirements at the jobsite.

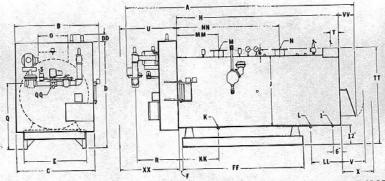
#### STACK REQUIREMENTS

Design stack to provide .02" water column draft at the flue outlet. Smooth transitions and bends are required. Generally, full size rectangular or equivalent round stacks should be used. Maximum stack weight on boiler should not exceed 1,000 pounds.

#### AIR REQUIREMENTS

Provide % square foot of free air inlet area per 1,000,000 Btu input to burner or 3 square inches per boiler horsepower. Preferably, use cross ventilation in lieu of a single opening.

See manuals for full installation details.



HOT WATER BOILER DIMEN!

		CLYCHILL		- W	_					THE PARTY AND	
HORSEPOWER:		C-10-W	C-15-W	C-20-W	C-30-W	C-40-W	C-50-W	C-60-W	C-80-W	C-100-W	C-125-
OVERALL DIMENSIONS:		- 0.50	\$ 5 % E		365 250	200		33,000			-
LENGTH	A	141	141	141	147	147	147	149	151	160	160
WIDTH	В	36	36	36	42	42	42	47	47	56	56
BURNER WIDTH	C	20	29	29	35	95	35	40	40	51	51
BURNER HEIGHT	D	53	53	53	61	61	81	68	68	74	74
SECONDARY AIR CAP HEIGHT	DD	- 8	6	6	6	6	6	6	6	- 6	_=
DASE:		200			\$100.5		100	4000		75	
WIDTH	E	24	24	24	24	24	24	30	30	36	36
LOCATION		20	20	20	20	20	20	20	20	25	26
LENGTH	FF	60	60	80	60	60	60	60	60	80	60
SHELL:			104	- 53	-	25		100	100		-
LENGTH	н	108	108	108	108	108	108	108	108	114	114
DIAMETER INSIDE	- 1	24	24	24	30	30	30	36	36	42	42
SHELL CONNECTIONS:	10.00	100		200			100	100	SIL 1		
DRAIN SIZE	K	1	1	1	1	1%	1%	1%	1%	1%	1%
DRAIN LOCATION	KK.	16	16	15	16	16	16	16	16	22	22
MANUAL FILL SIZE	L	1%	1%	1%	1%	15	1%	1%	11/2	1%	1%
MANUAL FILL LOCATION	LL	23	23	23	23	23	23	23	23	23	23
HOT WATER OUTLET SIZE	м	2	2	2 Va	3	3	41	41	41	41	18
HOT WATER OUTLET LOCATION	мм	26	26	25	28	28	26	26	28	33	33
HOT WATER RETURN SIZE	N	2	2	216	3	3	41	41	41	41	18
HOT WATER BETURN LOCATION	NN	64	64	64	64	64	84	64	64	71	71
GAS CONNECTIONS:	18				THE SE		S SUFFE				-
MAIN BURNER VALVE IPS (Note 5)	QQ	1	1%	1%	-11/6	2	2	214	3	3	3
VERTICAL LOCATION	a	33	33	33	35	36	36	39	39	42	42
HORIZONTAL LOCATION (Note 4)	R	20	20	20	22	22	22	24	28	26	28
PILOT BURNER VALVE IPS		- 4	*4	- %	1/4	1/4	¥,	4	- Yı	1/4	4.
FLUE CONNECTIONS:	HEE	100	100	V - 2 P = 0	THE TO			A LEASE		1862.25	
FLUE SIZE (Note 6)	0	6	6		6	10	10	10 x 10	10 x 15	10 1 18	100000
FLUE LOCATION	Y	5	5	6	6	1	7	5	5	5	
FLUE HEIGHT	11	49	43	43	49	49	49	55	66	61	61
INSTALLATION CLEARANCES:		V		S 222			5.50			2 500.0	333
COMBUSTION ASSEMBLY SWING	U	37	37	37	46	46	46	51	53	62	62
AELIEF DOOR SWING (Note 7)	V	17	17	17	18	18	16	20	20	24	24
TUBE REMOVAL, FRONT (Note 8)	XX	73	73	73	73	73	73	73	75	66	66
TUBE REMOVAL, REAR (Nois B)	×	71	71	71	71	71	71	71	71	72	72
RELIEF DOOR ASSEMBLY	VV	10	10	10	10	10	10	10	10	11	11
BLOWER HORSEPOWER:		- 41	1	1	11/2	1%	2	3	3		5

# FORM H-2 MANUFACTURERS' DATA REPORT FOR ALL TYPES OF BOILERS

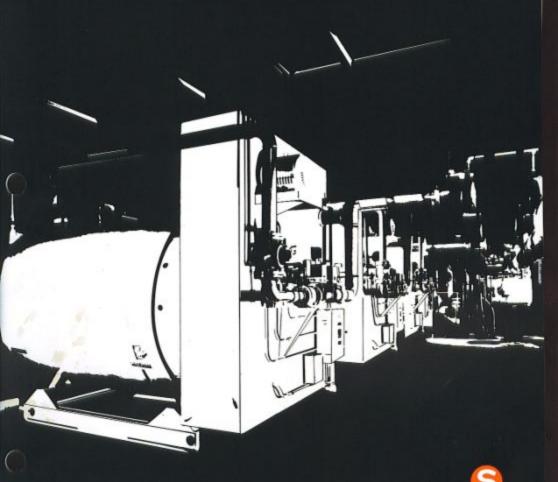
1.

EXCEPT WATERTUBE AND THOSE MADE OF CAST IRON 98801 As Required by the Provisions of the ASME Code Rules

-20-W, 100#				- 03	wille	. Ker	Walnut St	0422	
Certified & Sellers	Engir	neering	Company	na saoress of	manufacture	rl .			TCOPEL
Manufactured forSTOCK-	SKI-C	o. Cont	ractors, A.	The more	e ilventa.	Keir	ier high	SCHOOL, DO	
Location of Installation	- Pate	DAR, Ke	ller, TX	Trisme sho .	C	258-5	215-6 64	144 19	987
Gas fired	Boiler	ID No	05. 8351	AL NE.)	(CRN)	(Drawn	0 Ng.1 (NA	I'l Bra. No I	
Unit Identification (Competent) The chemical and physical pro	iler, superhe	ID No	(mir). Set						Pressure
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The chemical and physical provessel Code. The design, consi									
			24 1.D.	engin 1	08	_Dia		Length -	
Boiler Shells or Drums: No.	Une	Dia	4" -Thic	k			eat michness!	12 (12)	
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. Longitudinal Joint(s)	(54	amiess. Welce	ret .		10	One.			
	FR9/10/95/21/95		. I CL -II Cour			0110			
Girth Joint(S)	15. Weldedi		,	1/32"		911-94			
Girth Joint(s) We I d  Seamle  SA285-( Mail Special Sp	3	/4"1	lube Holes	17 30			(Di4-)		095
I TUBE SHEET MAI'S SPEC.	prade, Thick	nest:	- 5A1	78A	2" Ler	ngin_	84	Gau	e iar Iniciness
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(Wat 1 Shares							ar Dient		- 1.15
2. Heads SA-285-C							gius of Clark!		
2. Heads No. NA Size			-ab cartion	Total	100	Type -	(Pi)	r. Corrugales. 110	1
13 Fumace No. NA Size	2 41 W 1 H	Length, E	ach acctions						
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14. Staybolts: No. NA Pitch Iner and Vert.)	Siz MA	pec., L Gr 1	Thickness	(Diam., /	Aarn. Spec. G	race Site	Tellrale, NEI Afe		erroren erroren erroren
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14. Staybolts: No. NA	Siz MA	pec., L Gr 1	Thickness	(Diam., /	Aal'). Spec. G	rade Sitt	Diet. Tubes 10 Shell	Area to be	MAWP psi.
Pitch And Veril  15. Slays or Braces  Location	MA Material	pec., L Gr 1	Thickness	psl.	Aal'l Spec G	nage Site	Dist. Tubes 10 Shell	Area to be Stayed	MAWP
Pitch Ingrans veril  Stays or Braces  (a) F.H. above tubes	MA Material	WP	Thickness	psl.	Aal'l Spec G	nage Site	Diet. Tubes 10 Shell	Area to be Stayed	MAWP psi.
Pitch the and veril  S. Slava or Braces  (a) F.H. above tubes  (b) R.H. above tubes	MA Material	wP	Thickness	psl.	Aal'l Spec G	nage Site	Dist. Tubes 10 Sheet 10 5 10 5 10 5	Area to be Stayed	MAWP psi.
Pitch Ingrand vert.)  15. Slays or Braces  (a) F.H. above tubes (b) R.H. above tubes (c) F.H. peliow tubes	MA Material	wP	Thickness	psl.	Aal'l Spec G	nage Site	Dist. Tubes 10 Sheri 10 S 10 S 10 S 8 S	Area to be Stayed	MAWP psi
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14. Staybolts: No. NA  Pitch  Inst and veri.) 15. Stays or Braces  (a) F.M. above tubes (b) R.M. above tubes (c) F.M. palow tubes (d) R.M. balow tubes (e) Through stays 16. Other Parts 1. No. 17. Openings: 10. Staysm - Drain (c) BYXXXY One 1111 (a) Mandholes: No. (j) Mandholes: No. (j) Mandholes: No. (j) Mandholes: No. 18. Boller Supports: No.	MARIENIAI SDEC.	Tipe  Thru	Mac.  Me.  Sile  Le Dome, Boile? P  COUD.  And Type:  Front Locations  Lize  Type Skid  LizeOoil	psl.  psl.  psl.  pilen  pilen	Total Inches to the first	3 3 One 3	Dist. Tobes 10 ts then 10 ts 1	Coup.  She Sin was I'v.  Bott. R  Tran are Locate  Shell	pat.
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14. Staybolts: No. NA  Pitch  Inst ans veri.)  15. Stays or Braces  (a) F.H. above tubes (b) R.H. above tubes (c) F.H. below tubes (d) R.H. below tubes (e) Through stays 16. Other Parts 1. No.  1. 2. 3. Hot. Wa 17. Openings: 10.3 SHMRN - Drain (c) BYNNSH One 11"  (d) Manhotes: No. (i) Handhotes: No. (ii) Handhotes: No. (ii) Staybolts: No. 18. Golfer Supports: No. 18. Golfer Supports: No.	MANAGERIAL  MARKETIAL  SDEEL  (Brief  LEVEL ONE  NOME  2	Tipe  Thru	Ma.  Silb  As Dame, Boiler P  [Matt: Spec. Ore COUP. Front Lacetimn  Size 35  Type Skild  In HG 301 EH  Loop Fee. Andre	psi.  psi.  psi.  psica  psica	Total Net Area (b) Satety V (c) Coation — Location — Attachia	3 3 3 3 3 3 3 3	Dist. Tobes 19 Sharl 10/5 10/5 10/5 8/5 8/5 8/5 8/5 8/5 RH (1) Weld 42.4	Coup.  She Sin was I'v.  Bott. R  Tran are Locate  Shell	psi.

namarks: Manulacturers' Partial Data Reports properly identified and signed by Commissioned inspectors have been fur following items of this report: NONE	ties Lies
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CERTIFICATE OF COMPLIANCE	
e certify the statements in this data report to be correct.  -15-87 Signed Sellers Engr. Co. by Islandance Representation	
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the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Visional Report of Science and English and employed by The Hartford Sceam Roller Inspection.  Ordans of Company of Hartford CT have inspected parts of this boiler referred.	ed to as cata items
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the heat of my knowledge and belief, the Manufacturer has constructed this boiler in accordance to	with the applicable
and state that, to the best of my knowledge and ballet, the Mentilaction in South Market of the ASME BOILER AND PRESSURE VESSEL CODE.	coming the boiler
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By signing this certificate neither the inspector nor his employer makes any waitany, described in this Manufacturer's Data Report, Furthermore, neither the inspector nor his employer shall be liable in a described in this Manufacturer's Data Report, Furthermore, neither the inspector nor his employer shall be liable in a described in this employer shall be liable in a described in this inspection. OHIO common personal injury or grapherly deprise or a loss of any kind arising from or connected with this inspection.	n.
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We certify that the field assembly of all parts of this boilar conforms with the requirements of SECTION IV of the	ASME BOILER AND
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Report with the described boiler and state that the parts referred to as data items.  cluded in the certificate of shop inspection, nave been inspected by me and that to the best of my knowledge and be cluded in the certificate of shop inspection, as well as the boiler in accordance with the applicable sections of the	ASUS BOU FR AN
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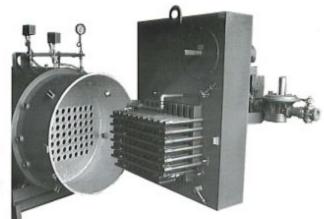
## SELLERS Immersion Fired Boilers



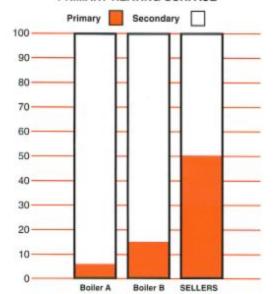
### **Immersion Firing Principle**

The immersion fired boiler is based on the principle that the most effective heating surface in any boiler is the primary or radiant heating surface. This is the surface on which the fire shines. The primary heating surface absorbs 65% to 70% of the heat radiated by the burner flame in any boiler. The immersion boiler was designed to utilize this principle and maximize primary heating surface. In a Sellers boiler, 50% of the total heating surface is primary as compared to 5% to 14% in an ordinary boiler. This large percentage of primary heating results in balanced heat transfer and longer life.

Research performed by the National Academy of Science, Report #44, determined that the amount of primary heating surface is the key to efficiency and long boiler life. Immersion firing gives you more primary heating surface than any other boiler on the market.



### PERCENTAGE OF PRIMARY HEATING SURFACE



### Design Advantage

The immersion fired boiler offers many advantages over other boilers that are on the market today. This unique design has been proven to perform since 1931 and is unlike any other. The design advantages include:

- Guaranteed High Efficiency Performance
- The Industry's Longest and Most Comprehensive Thermal Shock Warranty
- Lower Emissions of NOx and CO
- Dramatically Reduced Maintenance Costs
- Absolutely No Refractory
- U.L. Labeled Packaged Boiler
- Five Year Non Pro-rated Burner Warranty

## **Built To Last**

### Sellers Eliminates Refractories

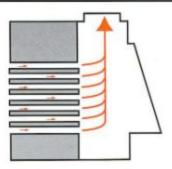
The Sellers immersion firing system is more than efficient. Design simplicity and rugged construction give you a boiler that is built to last. The Sellers immersion fired boiler does not contain refractory of any kind. None in the front. None in the rear.

In many multipass boilers, flame and hot gases are directed from pass to pass with special refractory. High temperatures and the stress of constant heating and cooling make for a short service life. Yearly maintenance and periodic replacement becomes a costly and time consuming requirement. These costs are completely eliminated with a Sellers.

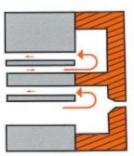
### Sellers Eliminates Thermal Shock

Thermal shock can ruin a boiler, It is caused by the metal components in a boiler expanding or contracting unevenly. This can be caused by low feedwater temperatures, firing a cold boiler or uneven heat transfer rates across the heating surface. The result of thermal shock can be loose tubes, cracked tube ligaments or tube sheets. There are no thermal shock problems with the Sellers boiler. As shown in the graphic below, the single pass design eliminates the tremendous stresses that are associated with very high temperature differentials between the furnace and the sucessvie passes of tubes in an ordinary boiler. Expansion is equal in all tubes, tube sheets are kept cool, and hot spots are eliminated.

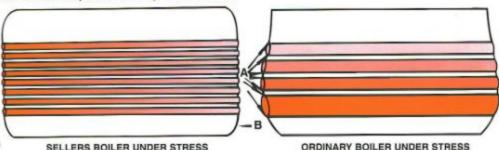
SELLERS BOILER UNDER STRESS



SELLERS BOILER: Efficient one-pass firing means no refractories and no refractory maintenance.



ORDINARY BOILER: Complex refractory shapes break down under operating conditions, resulting in frequent and costly repairs.



THERMAL SHOCK: In a multi-pass boiler, the different passes of tubes are heated to different temperatures. As a result, tremendous stresses are applied to the tube sheets and tube junctions (A), distorting and fatiguing the steel. A Sellers heats all tube sheets and junctions evenly. Adequate spacing between the tube bank and the boiler shell (B) allows the tube sheet to flex naturally in a Sellers.

# Performance and Dependability

### Ease of Maintenance

All boiler owners and operators appreciate the simple design and easy operation of a Sellers boiler. Routine service is simple. The front hinged burner door swings open for easy access to the burner. No complicated linkages and drive motors to get out of adjustment. Absolutely no refractory to repair or replace. Sellers uses standard boiler trim and controls that are available everywhere. This aids in parts availability and keeping maintenance costs low by avoiding high priced proprietary components.

### Stays Cleaner

Small diameter tubes provide a scale cracking feature. Any scale forming on the tubes becomes hard and inelastic. The alternate slight expansion and contraction of the tubes under intermittent firing loosens hard scale. It drops to the bottom of the shell and without "hot bottom" baking, they remain in small loose pieces for easy removal. This feature helps especially with high make-up process boilers or applications where the boiler must operate under extreme conditions.

Fireside surfaces stay cleaner due to high velocities and clean combustion eliminating the need to brush the tubes clean.

### **Champion Performance**

For over seventy years Sellers boilers have been built to meet the toughest demands of owners and consulting engineers. Sellers simplicity of design, high efficiency performance, safety of operation and reliability make it a champion in the boiler industry. Even with this high level of performance, a Sellers is still attractively priced.

### **Air-Gas Mixing**

The Sellers premix type burner manifold creates ideal intimate mixing conditions for gas and air, a result difficult to obtain and maintain with a nozzle mix burner. Since immersion firing is designed to burn gas and only gas, no compromise in design is necessary to accommodate oil.

