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ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 15514

LOW PRESSURE WATER HEATING BOILERS (UNDER 235KW OUTPUT)
05/02

NOTE: This guide specification is issued by the
Atlantic Division, Naval Facilities Engineering
Command for regional use in Italy.

NOTE: This guide specification covers the
requirements for low pressure hot water heating
boilers under 235 kilowatt output.

Comments and suggestion on this specification are
welcome and should be directed to the technical
proponent of the specification. A listing of
technical proponents, including their organization
designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer
choices or locations where text must be supplied by
the designer.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the
extent referenced. The publications are referred within the text by the
basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z21.13 (1991; Addenda 1993 and 1994) Gas-Fired
Low-Pressure Steam and Hot Water Boilers

ANSI Z83.3 (1971; Addenda 1972 and 1976, R 1989) Gas Utilization Equipment in Large Boilers

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME CSD-1 (1995) Controls and Safety Devices for Automatically Fired Boilers

ASME BPVC SEC IV (1995; Addenda 1995 and 1996) Boiler and Pressure Vessel Code: Section IV Heating Boilers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1996) Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless

ITALIAN ELECTROTECHNICAL COMMITTEE STANDARDS (CEI)

NOTE: A CEI Norm is an Italian technical normative for electrical systems recognized by Italian Law, submitted by a private organization "Comitato Electrotecnico Italiano" for the Italian territory, available in the Italian language and only in some cases in English.

CEI 64-8 (1998) Electrical installations of buildings

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

NOTE: Italian laws and normatives are the legislative regulations and decrees issued by the Italian government in the form of laws, norms, decrees, circulars, and letters. These Laws and Decrees concur together with Norms and Standards in forming the governing directives for construction.

Circolare 29 (5/12/77) Safety Norms for Hot Liquids Equipment Under Pressure

Law 10 (9/1/91) Norms for the Implementation for Energy Conservation and Renewable Sources

D.P.R. 412 (8/26/93) Norms Regulation for Installation and Maintenance of Thermal Systems

D.M. 12/4/96 Technical Norm Regulation for the Design,

Construction and Operation of Heating
Plant Systems

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

**NOTE: A UNI Norm is a technical normative
recognized as Italian Law, submitted by a private
organization "Ente Nazionale Italiano di
Unificazione" for Italy and is available only in
the Italian language. It is the National Standard.**

UNI 1307/1	(1986) Terminology for metal welding - Welding processes
UNI 1307/2	(1987) Terminology for metal welding - Types of welded joints
UNI 6883	(1971) Steam and pressure hot water generators - Order and testing rules
UNI 9731	(1990) Chimneys - Classification by thermal resistance - Measure and test

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN)
(UNI EN ISO)(UNI ISO)

**NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI
ISO is a European Standard with a coincident
Italian National Standard or International
Standard. The two standards are identical, with
most (but not all) EN's available in the English
language and the UNI available only in the Italian
language.**

UNI EN 230	(1990) Monobloc oil burners - safety, control and regulation devices and safety times
UNI EN 297	(1994) Gas-fired central heating boilers - Type B11 and B11BS boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW
UNI EN 304	(1992) Heating boilers - Test code for heating boilers for atomizing oil burners
UNI EN 625	(1995) Gas-fired central heating boilers - Specific requirements for the domestic hot water operation of combination boilers of nominal heat input not exceeding 70 kW

ITALIAN WELDING INSTITUTE (IIS)

IIS

Italian Welding Institute Publications and
Manuals

1.2 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section, with the additions and modifications specified herein.

1.3 DESIGN REQUIREMENTS

NOTE: Insert boiler output capacity or indicate in boiler schedule. Select boiler design working pressure, operating pressure, operating temperature, and return water temperature and indicate in boiler schedule on drawings.

Boiler shall be installed in accordance with D.M. 12/4/96. Boiler shall be suitable for installation in the space shown with ample room for opening doors and cleaning and removal and replacement of tubes. A minimum access of 450 mm shall be provided all the way around the boiler for maintenance. Boiler shall have an output of [_____] kW. Boiler shall be designed, tested, and installed in accordance with ASME BPVC SEC IV, Law 10, D.P.R. 412, Circolare 29, and ASME CSD-1. Paint boiler in accordance with manufacturer's recommendations. Boiler design working pressure shall be [207 kPa (gage)] [_____]. Boiler operating pressure shall be [83 kPa (gage)] [_____]. Boiler operating temperature shall be [82 degrees C] [_____]. Boiler return water temperature shall be [71 degrees C] [_____].

1.3.1 Detail Drawings

Submit water piping schematic, boiler stack riser diagram, fuel trains schematic, and wiring diagrams.

1.3.2 Water Analysis

Provide test reports of water analysis.

1.4 SAFETY STANDARDS

Hot water boilers, burners and supplementary control devices, safety interlocks, or limit controls required under this specification, shall meet requirements of the following standards as applicable:

- a. Oil-Fired Units: UNI EN 304.
- b. Gas-Fired Units: ANSI Z83.3, ANSI Z21.13 or UNI EN 625.
- c. Combination Gas- and Oil-Fired Units: ANSI Z83.3, ANSI Z21.13, UNI EN 304, and UNI EN 625.

- d. All Units: ASME BPVC SEC IV, ASME CSD-1, D.P.R. 412, and Circolare 29.

Controls not covered by the above shall comply with CEI 64-8.

1.5 SUBMITTALS

NOTE:

Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Water piping schematic

Boiler stack riser diagram

Fuel trains schematic

Wiring diagrams

SD-03 Product Data

Boilers: power output, efficiency, ASME certification, allowable working pressure, model number

Boiler trim and control equipment

Burners and control equipment

Stack, breeching, and supports

SD-06 Test Reports

Operational tests

Water analysis

SD-07 Certificates

Boilers

Burners and control equipment

Boiler trim and control equipment

Boiler manufacturer's certificate of boiler performance including evidence that the burners provided shall be a make, model, and type certified and approved by the manufacturer of the boiler being provided.

SD-08 Manufacturer's Instructions

Boilers

Feedwater treatment feeder

SD-10 Operation and Maintenance Data

Boilers, Data Package 4

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

SD-11 Closeout Submittals

Posted operating instructions for heating water boilers

1.6 GENERAL

1.6.1 Associated Work

Other work associated with heating, hot water system including insulation of equipment and piping, hot water piping, space temperature controls, vibration isolation, painting and marking of equipment, and testing and

balancing air and water system is covered in other sections of this specification

1.6.2 Classes and Maximum Working Pressure

Except as specified otherwise, equipment and piping components shall be suitable for use under the maximum working pressures indicated. Except as modified herein, the pressure and temperature limitations shall be as specified in the referenced standards and specifications. All pressures in this specification are in units above atmospheric pressure (Gage Pressure).

1.6.3 Standard Commercial Product for Boilers

The boiler shall be constructed in accordance with requirements of the ASME boiler and pressure vessel code and must receive authorized boiler inspection prior to shipment. A copy of the inspection report shall be furnished to the Contracting Officer. Boilers shall be the manufacturer's standard commercial product constructed in accordance with ASME and certified BPVC. Prior to commencement of construction, the Contractor shall submit a certified written report from the boiler manufacturer to show that substantially identical equipment of comparable capacity (within 20 percent) has been successfully installed and operated in at least three installations under similar operating conditions. The report shall include the date of installation, type, model, capacity, and address location of installed boilers. A standard commercial product is a product which has been sold or is currently being offered for sale on the commercial market through advertisements or manufacturer's catalogs or brochures.

1.6.4 Service Availability

The Contractor shall submit a certified list of qualified permanent service organizations for boilers, boiler controls, and instrumentation which includes their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.5 Safety Standards

1.6.5.1 Welding

Safety in welding and cutting of pipe shall conform to IIS, UNI 1307/1 and UNI 1307/2.

1.6.5.2 Guards

Couplings, motor shafts, gears and other moving parts shall be fully guarded. Guards shall be cast iron or expanded metal. Guard parts shall be rigid and suitably secured and be readily removable without disassembling the guarded unit.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

1.7.2 Drawings

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the plumbing, fire protection, electrical, structural and finish conditions that would affect the work to be performed and shall arrange such work accordingly, furnishing required offsets, fittings, and accessories to meet such conditions.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Boilers

The following manufacturers provide boilers, trim, stacks, and control equipment that generally comply with these specifications:

BONGIOANNI
Nuova BPFK S.r.l.
Via Cervasca, 6
12010 Vignolo (CN)
Tel: 0171.407111
Fax: 0171.407350

CARBOFUEL S.p.A.
Via A. Colombo, 110
21055 Gorla Minore - VA
Tel: 0331-336111

CORDIVARI S.r.l.
Via Padova - Zona Artigianale
64020 Morro D'Oro (TE) - Italy
Tel: 39.03766851
Fax: 39.0376685600

GBD Srl
Via Al Piano, 41
22100 Como (Loc. Albate)
Tel: 031/524441
Fax: 031/523332

HOVAL
Carival Srl
Via per Azzano S. Paolo, 26/28
24050 Grassobbio (BG)
Tel: 035/525069
Fax: 035/525858

RIELLO
R.B.L. Riello Bruciatori Legnago SpA
37045 Legnago (VR)
Via degli Alpini, 1
Tel: 0442-630111
Fax: 0442-22378

2.1.2 Gas Valves

The following manufacturers provide gas valves that generally comply with these specifications:

EURONOVA INT.
www.euronova.net

VALVOTUBI IND S.r.l.
Via Monti, 30/B
48100 Ravenna - Italy
Tel: 0039-544/452279
Fax: 0039-544/451148

2.2 BOILERS

NOTE: Select boiler type and style required.

Boilers shall be constructed, tested and stamped in accordance with ASME and applicable regulations of UNI 6883. Provide hot water heating boiler complete with firing equipment, combustion chamber, insulation with steel jacket, safety and operating controls, integral electrical wiring and other appurtenances, to make the boiler a complete, self-contained, fully-automatic unit, ready for service upon completion of utility connections. [Boilers less than 88 kW shall have an Annual Fuel Utilization Efficiency (AFUE) of at least 80 percent.] [Gas fired boilers greater than 88 kW output shall have a steady state combustion efficiency of at least 80 percent when fired at the maximum and minimum capacities which are provided and allowed by the controls.] [Oil fired boilers greater than 88 kW output shall have a steady state combustion efficiency of at least 83 percent when fired at the maximum and minimum rated capacities which are provided and allowed by the controls.]

2.2.1 Cast Iron Boiler

Boiler shall be of the rectangular, sectional type, self-contained, packaged type, complete with accessories, mounted on a structural steel base. Cast iron sections shall be free of leaks under all operating conditions. Access shall be provided to permit cleaning of internal tube surfaces. Design shall allow removal of any intermediate section for replacement. Provide gasketing between sections.

2.3 BURNERS AND CONTROL EQUIPMENT

**NOTE: Indicate fuel trains on the drawings.
Conform to the requirements of ASME CSD-1 and
MIL-B-18796. See MIL-B-18796 for guidelines for
selection of a combustion control systems. Do not
use atmospheric type gas burner in Italy.**

[2.3.1 Gas-Fired Power Burner

Gas-fired power burner (over 117 kW input). UNI EN 297. Interrupted pilot type ignition system, and pilot shall be the electrode-ignited natural gas type.[Provide modulating fire, automatic recycling burner.] Design burner and combustion control equipment for firing natural gas having a specific gravity of [0.6] [_____] and a heating value of approximately [37,300 kJ per cubic meter] [_____] and be an integral part of the boiler. Burner controls and safety equipment shall conform to applicable requirements of UNI EN 297. Mount controls; including operating switches, indicating lights, gages, alarms, motor starters, fuses, and circuit elements of control systems on a single control panel or cabinet designed for separate mounting not on the burner in accordance with UNI EN 297. The combustion control system shall be the [on/off] [high-low-off] [positioning] [metering] type. Locate flame scanner such that testing and cleaning of scanner can be accomplished without disassembly of burner. Provide fuel train as indicated. Gas pressure available: [_____] Pa gage] [_____] kPa (gage)].

] [2.3.2 Oil-Fired Power Burner

Oil-fired power burner (under 117 kW input). UNI EN 304. Direct electric-spark-ignited type ignition system.[Provide modulating fire, automatic recycling burner.] Burner controls and safety equipment shall conform to applicable requirements of UNI EN 304. The combustion control system shall be the [on/off] [high-low-off] [positioning] [metering] type.

] [2.3.3 Oil-Fired Power Burner

Oil-fired power burner (over 117 kW input). UNI EN 230. Pressure-atomizing type burner.[Provide modulating fire, automatic recycling burner.] Direct electric-spark-ignited type ignition system. Design burner and combustion control equipment for firing commercial grade number 2 fuel oil and be an integral part of the boiler. Burner controls and safety equipment shall conform to applicable requirements of UNI EN 230. The combustion control system shall be the [on/off] [high-low-off] [positioning] [metering] type. Mount controls; including operating switches, indicating lights, gages, alarms, motor starters, fuses, and circuit elements of control systems on a single control panel or cabinet designed for separate mounting not on the burner in accordance with UNI EN 230. Locate flame scanner such that testing and cleaning of scanner can be accomplished without disassembly of burner. Provide fuel train as indicated.

] [2.3.4 Gas and Light Oil-Fired Power Burner

Gas and light oil-fired power burner (over 117 kW Input). UNI EN 304 and

UNI EN 230. [Provide modulating fire, automatic recycling burner.] The combustion control system shall be the [on/off] [high-low-off] [positioning] [metering] type. Pressure-atomizing type oil burner. Interrupted-pilot type ignition system, and pilot be electrode-ignited natural gas type, except that the oil burner be direct electric-spark-ignited. Design burner and combustion control equipment for firing commercial grade number 2 fuel oil and natural gas having a specific gravity of [0.6] [_____] and a heating value of approximately [37,300 kJ per cubic meter] [_____] and be an integral part of boiler. Burner controls and safety equipment shall conform to applicable requirements of UNI EN 304 and UNI EN 230. Mount controls; including operating switches, indicating lights, gages, alarms, motor starters, fuses, and circuit elements of control systems on a single control panel or cabinet designed for separate mounting not on the burner in accordance with UNI EN 304 and UNI EN 230. Locate flame scanner such that testing and cleaning of scanner can be accomplished without disassembly of burner. Provide fuel train as indicated. Gas pressure available: [_____] Pa gage] [_____] kPa (gage)].

2.3.4.1 Oil pump

Provide oil pump with capacity of approximately 125 percent maximum burning rate shall be furnished complete with burner. The oil pump shall be belt driven from double shaft blower motor.

]2.3.5 Combustion Control/Flame Safeguard System

Provide a microprocessor based combustion control and flame safeguard system. Controllers and accessories shall monitor and operate burner firing system; automatic burner cycling, flame supervision, status indication, annunciation, energy conservation and provide self-diagnostic capability. System shall consist of a microprocessor based combustion safeguard controller mounted adjacent to each boiler, and a master microprocessor based combustion control panel. Individual boiler controllers shall be networked to the master combustion control panel. Refer to sequence of operation and control diagrams on Contract drawings for interlocks and operational features required. Controllers shall be self-contained in metal enclosure/chassis with integral LCD digital readout of service codes and LED indication of the following functions.

- a. Standby
- b. Pre-Purge
- c. Hold
- d. Ignition Trial
- e. Flame On
- f. Run
- g. Post-Purge

Furnish with integral manual reset button. The system shall provide full

individually modulating control of fuel and combustion air as well as firing rate based on demand. The system shall incorporate a tailored pre-purge cycle to maximize energy efficiency while maintaining the required purge air changes. Provide user programmable rate control program for precise load tracking while reducing on-off cycling due to load swings.

Furnish ultraviolet flame sensor and flue gas sensor. Provide continuous monitoring of burner flame and flue gas oxygen percentage. Controller shall modulate gas and forced draft fan damper to minimize excess air. Provide sensors and interlocks to boiler gas train for low and high pressure safety cutout. Provide all interlocks, factory wired, to burner flame failure panel. Provide data gathering panel to facilitate communication of the master combustion control panel to the DDC system. Verify connection ports, software, communication language and interlocks with the DDC manufacturer. Data gathering panel shall be fully compatible with the DDC system. Provide dry contacts for DDC system interface. The following functions shall communicate through the DDC interface:

- a. Boiler enable/disable
- b. Supply water temperature setpoint
- c. Alarm status
- d. Boiler status (on/off)

2.3.6 Burner Gas Train

Provide the following equipment factory piped and assembled for natural gas firing. Provide one lubricated plug cock with removable handle. Provide bronze or cast steel body, diaphragm type pressure regulator. Coordinate regulator response with gas operating valves, a narrow proportional band will be required. Provide the following valves; two motorized safety shutoff valves with proof of closure switches, one modulating butterfly-type gas valve, leak test valve, vent valve, pilot gas cock, pilot gas pressure regulator, pilot solenoid valve. Gas train shall be sized to deliver the specified volume of natural gas as scheduled on drawings. Provide high and low gas pressure cutout switches.

2.4 BOILER TRIM AND CONTROL EQUIPMENT

NOTE: Include MIL-B-18796 if power burner with input exceeding 117 kW is required.

Provide in accordance with UNI EN 230 and UNI EN 304 and additional requirements specified below.

2.4.1 Emergency Disconnect Switch

NOTE: Indicate location of emergency disconnect switch on drawings. Insert emergency switch amperage required.

Provide and locate on wall outside boiler room entrance or just inside door, when boiler room door is on building exterior to allow rapid and complete shutdown of the boiler in the event of an emergency. Emergency switch shall be a [_____] -amp. fuse-type safety switch. Switch shall be red and furnished with a label indicating function of switch.

2.4.2 Relief Valves

NOTE: Local sanitary and health agencies (A.S.L.'s) have taken the place of the Italian National Association For Combustion Control (ANCC). Verify any particular requirements that may be applicable in the region of the project.

The boiler shall be provided with one or more relief valves. The aggregate relieving capacity of the relief valves shall not be less than that required by local A.S.L. (Sanitary and Health Agency) and Italian law. This discharge from the valves shall be run to the nearest floor drain or installed as indicated. The pressure relief valve shall be adjusted to open automatically when the pressure within the heating system rises above, 2 bar gauge. Relief-valve piping shall conform to ASTM A 53, schedule 40 steel pipe and be piped full-size to a floor drain.

2.4.3 Pressure and Altitude Gage or Combination Pressure/Altitude Gage

UNI EN 304. Provide one located on supply water piping and one on return water piping.

2.4.4 Thermometer

Provide thermometer with a scale equivalent to 1.5 times outlet water temperature. Provide one located on supply water piping and one on return water piping.

2.4.5 Drain Tapping

Provide drain valve and piping [to a floor drain] [to 150 mm above floor].

2.4.6 Make-up Water Station

2.4.6.1 Pressure Reducing Station

NOTE: Select operating pressure required.

Provide a water pressure-reducing valve and relief valve, or a combination of the two in the makeup water line to the boiler to maintain a water pressure of [83 kPa (gage)] [_____] in the hot water system. Provide a 20 mm globe valve by-pass around this valve.

2.4.6.2 Backflow Preventers

Section 15400, "Plumbing Systems." Locate upstream of by-pass.

2.4.7 Feedwater Treatment Feeder

Provide in accordance with Circolare 29 for a Shot-Type Feeder (manual, intermittent feed), for use with pressures up to 1379 kPa (gage) maximum.

2.4.8 Combustion Regulator

Provide adjustable temperature, thermostatic immersion type that shall limit boiler water temperature to a maximum of 121 degrees C. Control shall actuate burner through an electric relay system to maintain boiler water temperature within normal prescribed limits at loads within rated capacity of boiler.

2.4.9 Air Vent Valve

Provide with screwed connection, stainless steel disk, and stainless steel seats to vent entrapped air.

2.4.10 High Temperature Limit Switch

NOTE: Specify alarm and indicating lights if input exceeds 117 kW.

Provide immersible aquastat type with a temperature setting above that of the combustion regulator and below that of the lowest relief valve setting. Aquastat shall function to cause a safety shutdown by closing fuel valves[,] [and] shutting down burner equipment [, activating a red indicating light, and sounding an alarm] in the event that boiler water temperature rises to the high temperature limit setting. A safety shutdown due to high temperature shall require manual reset before operation can resume and prevent recycling of burner equipment.

2.4.11 Low Water Pressure Control

NOTE: Specify alarm and indicating lights if input exceeds 117 kW. Select operating pressure required.

Provide mercury switch type. Control shall have a main scale, adjusting screws at the top of the case, and have an internal or external bellows. Control shall be the type which will open an electric circuit on a drop in pressure below a set minimum. Control shall be set and installed to cause a safety shutdown by closing fuel valves[,] [and] shutting down burner equipment [, activating a red indicating light, and sounding an alarm] in the event that water pressure in the system drops below [83 kPa (gage)] [_____]. A safety shutdown due to low water pressure shall require manual

reset before operation can resume and prevent recycling of burner equipment.

2.4.12 Low Water Level Cutoff Switch

NOTE: Specify alarm and indicating lights if input exceeds 117 kW.

Provide float actuated type. Low water level cutoff shall cause a safety shutdown by closing fuel valves[,] [and] shutting down burner equipment [, activating a red indicating light, and sounding an alarm] in the event that water level drops below the lowest safe permissible water level established by the boiler manufacturer, ASME BPVC SEC IV, and Circolare 29. A safety shutdown due to low water shall require manual reset before operation can resume and prevent recycling of burner equipment.

2.4.13 Boiler Safety Control Circuits

NOTE: Include draft fan if power burner is specified.

Provide boiler safety control circuits, including control circuits for burner [and draft fan], shall be single-phase, two-wire one-side grounded, and not over 120 volts. Provide safety control switching in ungrounded conductors. Provide overcurrent protection. In addition to circuit grounds, ground metal parts which do not carry current to a grounding conductor.

2.4.14 Indicating Lights

NOTE: Delete entire paragraph if boiler input does not exceed 117 kW. Include draft fan if power burner is specified.

Provide indicating lights as follows. Each safety interlock requiring a manual reset shall have an individually-labeled indicating light. Non-recycling controls/interlocks shall have the reset located on control/interlock itself. Indicating lights shall have colors as follows in lieu of those required by UNI EN 297:

- a. Amber: Ignition on
- b. Green: Main fuel safety shut-off valves open
- c. Red (One for Each): Safety lockout, flame failure, low water pressure, low water level, and high temperature
- [d. Blue: Draft]

2.4.15 Alarm Bell

**NOTE: Delete entire paragraph if boiler input does
not exceed 117 kW.**

Provide alarm bell not less than 100 mm in diameter, electrically operated, with a manual disconnect switch. Disconnect switch shall be type and wired so that switching off alarm following a safety shutdown will not prevent alarm from sounding again upon recurrence of a subsequent safety shutdown condition.

2.4.16 Post-Combustion Purge

Provide controls and wiring necessary to ensure operation of draft fan for a period of not less than 15 seconds or of sufficient duration to provide four complete air changes in the boiler combustion chamber (whichever is greater) following shutdown of burner upon satisfaction of heat demand. Upon completion of post-combustion purge period, draft fan shall automatically shutdown until next restart.

2.4.17 Draft

Comply with boiler manufacturer's recommendations.

2.4.18 Stack, Breeching, and Supports

**NOTE: Use stainless steel outer jacket in coastal
environments.**

Breeching and flue stack shall be a double wall positive pressure venting system that shall extend from boiler flue collar continuous through the roof and terminate in a metal cap. The entire installation shall comply with recommendations of the boiler manufacturer. System shall have gravity backdraft section to avoid overdraft. All accessories and connectors for use with natural gas appliances shall be as required by UNI 9731. All flue gas conveying components shall be 25 mm thick air gap between, inner jacket stainless steel; 0.8 mm thick with outer jacket of [stainless steel] [aluminum coated steel]; 0.6 mm thick. All components shall be of a singular manufacturer, classified according to UNI 9731 and tested as an assembly. Provide all elbows, increasers, roof thimble, metal cap on discharge with bird barrier, and all intermediate supports and hangers.

2.4.18.1 Accessories

Provide all accessories including elbows, tees, increaser, ventilating thimble, roof support, stack cap, storm collar, flashing and support pieces.

2.4.18.2 Positive Pressure, Factory Constructed Double Wall Vents

Double wall metal stacks for use with building heating equipment burning

oil/gas.

2.4.19 Hot Water Coils

NOTE: Delete entire paragraph unless hot water coils are required to instantaneously heat domestic water.

Provide coils capable of heating [_____] L/s of water with [_____] degree C rise conforming to UNI EN 304 and D.P.R. 412.

2.4.20 Stack Thermometer

Provide flue gas thermometer with scale calibrated from 66 to 399 degrees C and mounted in flue gas outlet.

2.5 SLEEVES

Provide pipe sleeves where boiler stacks pass through masonry or concrete walls, floor, roofs, and partitions. Fasten sleeves securely in proper position and location before and during construction. Sleeves shall be of sufficient length to pass through entire thickness of walls, partitions, or slabs. Extend sleeves in floor slabs 50 mm above the finished floor or roof. Space between the stack and the sleeve shall provide 50 mm annular space free and clear around boiler stack.

2.6 GAS SUPPLY

Aboveground piping shall be as specified in Section 15195, "Natural Gas and Liquid Petroleum Piping".

2.6.1 Gas Valves

Provide valves with threaded end connections suitable for the intended service.

2.6.1.1 Gate Valves and Check Valves

Bronze gate valves of the wedge disc, rising stem, inside screw type, threaded end connections.

2.6.1.2 Angle Check Valves

Double poppet with metal-to-metal seat, cast-iron body, bronze poppets and seats, Buna-N O-rings, and brass screen.

2.6.1.3 Emergency Fuel Shut-Off

Provide emergency fuel shut-off valve to shut off gas flow at the building outside the Mechanical Room in stainless steel enclosure adjacent to the exterior door.

2.7 ELECTRIC MOTORS

NOTE: Select standard efficiency for motors used less than 750 hours per year and high efficiency for motors used over 750 hours per year. Packaged boilers should utilize the manufacturer's standard efficiency motor.

Motors which are not an integral part of a packaged boiler shall be rated for [standard] [high] efficiency per Section 16402, "Interior Distribution System." Motors which are an integral part of the packaged boiler system shall be the highest efficiency available by the manufacturer of the packaged boiler.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION

Install equipment in accordance with manufacturer's installation instructions. Grout equipment mounted on concrete foundations before installing piping. Install piping in such a manner as not to place a strain on equipment. Do not bolt flanged joints tight unless they match. Grade, anchor, guide, and support piping without low pockets. Feedwater treatment feeders shall be mounted so that the top of the feeder is no higher than 1219 mm above the finished floor.

3.2 EQUIPMENT FOUNDATIONS

Locate equipment foundations as indicated, designed, and made of sufficient size and weight to preclude shifting of equipment under operating conditions or under abnormal conditions that could be imposed upon the equipment. Foundations shall meet requirements of the equipment manufacturer. Concrete and grout shall conform to Section 03300, "Cast-In-Place Concrete."

3.3 BOILER CLEANING

Before being placed in service, boiler shall be boiled out for a period of 24 hours at a pressure not exceeding 83 kPa (gage). Solution to be used in the boiler for the boiling out process shall consist of 0.91 kg of trisodium phosphate per 379 liters of water. Upon completion of boiling out, flush out boiler with potable water, drain, and charge with chemically treated water. Protect boiler and appurtenances against internal corrosion until testing is completed and boiler is accepted. Professional services are required for cleaning/treatment process.

3.4 FIELD QUALITY CONTROL

Perform and furnish everything required for inspections and tests as specified herein to demonstrate that boiler and auxiliary equipment, as installed, are in compliance with contract requirements. Start-up and operate the system. During this time, clean strainers until no further

accumulation of foreign material occurs. Exercise care to minimize loss of water when strainers are cleaned. Adjust safety and automatic control instruments as necessary to place them in proper operation and sequence. Test instrumentation shall be calibrated and have full scale readings from 1.5 to 2 times test values.

3.4.1 Operational Tests

Operate each boiler and appurtenances prior to final testing and insure that necessary adjustments have been made. Provide testing equipment required to perform tests. During this testing period, provide operating instructions and training to persons tasked with operation of the boiler. Tests shall be accomplished with both fuels on dual fuel units and include the following:

3.4.1.1 Preliminary Operational Test

Operate the boilers continuously for a period of at least 8 hours to demonstrate proper operability of the combustion control, flame safeguard control, and safety interlocks.

3.4.1.2 Acceptance Operational Test and Inspection

Conduct a preliminary operational test prior to requesting an acceptance operational test and inspection by an EFA MED Division, Naval Facilities Engineering Command Boiler inspector. The Contracting Officer, upon receipt of the notice from the Contractor, shall request the boiler be inspected by EFA MED Division Naval Facilities Engineering Command. Fifteen days advance notice is required for scheduling inspector to conduct acceptance operational test and inspection.

-- End of Section --