
NAVFAC IGS-13935 (June 2003)

Supersedes IGS-13935 (02/03)
Preparing Activity: LANTNAVFACENGCOM Based on UFGS-13935N

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 13935

DRY-PIPE FIRE SPRINKLER SYSTEMS
06/03

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

NOTE: This guide specification covers requirements for automatic dry-pipe fire extinguishing sprinkler systems for unheated areas subject to freezing. System requirements must conform to Military Handbook MIL-HDBK-1008, "Fire Protection for Facilities Engineering Design and Construction" NFPA 13, "Installation of Sprinkler Systems" This guide specification is to be used in the preparation of project specifications in accordance with MIL-HDBK 1006/1.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the 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.

NOTE: If there are questions concerning system design, consult with the Engineering Field Division, Naval Facilities Engineering Command, Fire Protection Engineer.

NOTE: Following information shall be shown on project drawings:

1. Location and detail of each sprinkler system supply riser, dry pipe valve, water motor alarm, fire department inlet connection, pressure or flow switch, fused disconnect switch, and associated electrical connections.
2. Location where each sprinkler system begins including connection to water distribution system piping.
3. Location of sprinkler system control valves, post indicator valves, or wall indicator valves.
4. Area of sprinkler system coverage when system is protecting partial areas.
5. Details of anchoring piping, including pipe clamps and tie rods, or mechanical retainer glands.
6. Indicate existing sprinkler piping layout and sprinkler heads on project drawings only if existing sprinkler system is being modified and such layout is necessary for clarity.

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651 (1992) Disinfecting Water Mains

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 Elettrotecnico Italiano" for the Italian territory, available in the Italian language and only in some cases in English.

CEI 64-8/V1/V2 (1998/01/01) 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.

Law 46	(5/3/1990) Regulations for safety of systems
D.P.R. 447	(6/12/1991) Regulation of accomplishment of Law 46/90 concerning safety of 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 2223	1967 - Metallic pipe flanges. Templates for drilling circular flanges
UNI 5311	(1963) Gripping and holding appliances - Straps, clamps, squares and bearings - Summary of standard types
UNI 5336	(1969) Pipes, fittings and special castings for grey cast iron pressure main lines. Qualities, requirements and tests
UNI 6363/FA-199	(1984/86) Welded and seamless steel tubes for water mains
UNI 6884	(1987) Shutting and regulation valves for fluids - Supply and test conditions
UNI 7125/FA-109	(1972/82) Flanged gate valves for water pipelines - Technical conditions of delivery
UNI 7145	(1972) Pipe clamps for use on board ships - Summary of standard types
UNI 8863/FA-1	(1987/89) Unalloyed steel seamless and

welded tubes suitable for screwing in
accordance with UNI ISO 7/1

- UNI 9157 (1988) Water supply - Back flow preventer
- Characteristics and tests
- UNI 9489 (1989) Fire fighting equipment - Sprinkler
fire extinguishing systems
- UNI 9490 (1989) Fire fighting equipment - Water
supply for automatic fire fighting systems

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 545 (1995) Ductile iron pipes, fittings,
accessories and their joints for water
pipelines - Requirements and test methods
- UNI EN 1057 (1997) Copper and copper alloys -
Seamless, round copper tubes for water and
gas in sanitary and heating applications
- UNI EN 1254-1 (2000) Copper and copper alloys - Plumbing
fittings - Part 1: Fittings with ends for
capillary soldering or capillary brazing
to copper tubes
- UNI EN 1254-2 (2000) Copper and copper alloys - Plumbing
fittings - Part 2: Fittings with
compression ends for use with copper tubes
- UNI ISO 4179 (1987) Ductile iron pipes for pressure and
non pressure pipelines - Centrifugal
cement mortar lining - General requirements
- UNI EN 10242/A1 (2001) Threaded pipe fitting in malleable
cast iron
- UNI EN 12259-1 (2002) Fixed firefighting systems -
Components for sprinkler and water spray
systems - Sprinklers
- UNI EN 12259-2 (2002) Fixed firefighting systems -

Components for sprinkler and water spray systems - Wet alarm valve assemblies (

UNI EN 12259-3 (2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Dry alarm valve assemblies

UNI EN 12259-4 (2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Water motor alarms

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13 (1999) Installation of Sprinkler Systems

NFPA 24 (1995) Installation of Private Fire Service Mains and Their Appurtenances

UNDERWRITERS LABORATORIES (UL)

UL FPED (1999) Fire Protection Equipment Directory

UL 789 (1993; R 1994) Indicator Posts for Fire-Protection Service

1.2 SYSTEM DESCRIPTION

Design [and provide] [new] [and] [modify existing] automatic dry pipe fire extinguishing sprinkler systems for complete fire protection coverage throughout [_____].

1.3 SPRINKLER SYSTEM DESIGN

NOTE: Use hydraulic calculations for all new systems over 93 sq. m. Use hydraulic calculations or pipe schedules for new installations less than 93 sq. m, and for additions to existing pipe schedule systems. When hydraulic calculations are not included, delete paragraphs entitled "Water Distribution," "Density of Application of Water," "Sprinkler Discharge Area," "Outside Hose Allowance," "Friction Losses," and "Water Supply." Earthquake protection is required for buildings in seismic zones 3 and 4, and only essential and high risk buildings in seismic zone 2.

Design automatic dry pipe fire extinguishing sprinkler systems in accordance with the required and advisory provisions of NFPA 13, UNI 9489, Law 46 and D.P.R. 447, [by pipe schedules][or] [hydraulic calculations using the area/density method for uniform distribution of water over the design area] for [ordinary] [extra] hazard occupancy. Each system shall include materials, accessories, and equipment inside and outside the

building to provide each system complete and ready for use. Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Devices and equipment for fire protection service shall be approved for use in dry pipe sprinkler systems. [Design systems for earthquake protection.]

1.3.1 Location of Sprinkler Heads

Spacing of sprinklers and position and orientation of sprinklers in relation to the ceiling, walls, and obstructions shall conform to NFPA 13, UNI 9489, and UNI EN 12259-1 for ordinary hazard occupancy; except for discharge density greater than 136 ml/s per sq meter the spacing of sprinkler heads shall not exceed that for extra hazard occupancy. Uniformly space sprinklers on the branch piping.

1.3.2 Water Distribution

Distribution shall be uniform throughout the area in which the sprinkler heads will open. Discharge from individual sprinklers in the hydraulically most remote area shall be not less than 100 percent of the specified density.

1.3.3 Density of Application of Water

Size pipe to provide the specified density when the system is discharging the specified total maximum required flow. Application to horizontal surfaces below the sprinklers shall be [_____] L/m per sq meter.

**NOTE: Sprinkler designers shall use the criteria
from MIL-HDBK-1008 and not NFPA 13.**

1.3.4 Sprinkler Design Area

Area shall be the hydraulically most remote [_____] sq meter area as defined in NFPA 13 and UNI 9489.

1.3.5 Outside Hose Allowances

Hydraulic calculations shall include an allowance of [_____] L/m for outside hose streams.

1.3.6 Friction Losses

Calculate losses in piping in accordance with the Hazen-Williams formula with 'C' value of 100 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping. Velocity in the sprinkler piping shall be limited to a maximum of 0.0061 km/s.

1.3.7 Water Supply

Base hydraulic calculations on a static pressure of [_____] kPa (gage) with [_____] L/m available at a residual pressure of [_____] kPa (gage) at the [junction with the water distribution piping system.] [base of the sprinkler piping riser.] [Include discharge from fire pump[s] provided in Section 13920, "Fire Pumps" in the hydraulic calculations. Provide [35] [_____] kPa cushion between total calculated demand and the water supply.]

1.3.8 Detail Drawing

Prepare A1 841 x 594 mm detail working drawings of sprinkler heads and piping system layout in accordance with NFPA 13, "Working Drawings (Plans)" and UNI 9489. Show data essential for proper installation of each system. Show details, plan view, elevations, and sections of the systems supply and piping. Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams. Show location and orientation of sprinkler heads in relation to obstructions. [Submit drawings signed by a registered fire protection engineer.]

1.3.9 As-built Drawings

After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes. Submit A1 841 x 594 mm drawings on reproducible mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings required by Division 1, "General Requirements."

1.4 SUBMITTALS

NOTE: The "G" in submittal tags following each submittal item indicates Government approval and should be retained. Added submittal items not designated with a "G" will be approved by the QC organization.

Submit the following in accordance with Section 01330 "Submittal Procedures." EFAMED, Naval Facilities Engineering Command, Fire Protection Engineer, will review and approve all submittals in this section requiring Government approval.

SD-02 Shop Drawings

Sprinkler heads and piping system layout; G

Electrical wiring diagrams; G

SD-03 Product Data

Piping; G

Valves, including gate, check, and globe; G

Water motor alarms; G

Sprinkler heads; G

Pipe hangers and supports; G

Fire department connections; G

Low air pressure supervisory switch; G

Dry pipe valves; G

Air compressor; G

Mechanical couplings; G

Backflow Preventers; G

Pressure Switch; G

Annotate descriptive data to show the specific model, type, and size of each item.

SD-05 Design Data

NOTE: When a sprinkler system is designed using the pipe schedule method, delete the paragraph entitled "SD-05 Design Data."

Sprinkler system design; G

[Submit computer program generated hydraulic calculations to substantiate compliance with hydraulic design requirements. Calculations generated by computer program shall include the name, address, and telephone number of the software manufacturer.]

SD-06 Test Reports

Preliminary tests on piping system; G

SD-07 Certificates

Qualifications of installer; G

SD-10 Operation and Maintenance Data

Dry pipe valves, Data Package 3; G

Air compressor, Data Package 3; G

Submit in accordance with Section 01781, "Operation and

Maintenance Data."

SD-11 Closeout Submittals

As-built drawings of each system; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications of Installer

Prior to installation, submit data showing that the Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Aboveground Sprinkler Piping

The following manufacturers provide components and materials for aboveground sprinkler piping systems that generally comply with these specifications:

DALMINE

Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) Italy
Tel: 035560.1111
Fax: 0355603827
www.dalmine.it

OPPO Gesuino

Via Amerigo Vespucci, 1
09074 Ghilarza (OR)
Tel: 0785/54642
www.oppo.it

IANNONE ARM S.p.A.

Via Nuova Villa, 29
80100 Napoli
Tel: 081-7523788
Fax: 081-7523425

IANNONE TUBI s.r.l.

via Biagio Accolti Gil - zona industriale
Bari
Tel: 080-5311448
Fax: 080-5312976

2.1.2 Sprinkler Heads

The following manufacturers provide sprinklers that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

GENERAL FIRE
Via Casilina, 159
00176 Roma
Tel: 06/70301043/9
Fax: 06/70301043
www.generalfire.it

2.1.3 Sprinkler Head Cabinet

The following manufacturers provide sprinkler head cabinets that generally comply with these specifications:

GENERAL FIRE
Via Casilina, 159
00176 Roma
Tel: 06/70301043/9
Fax: 06/70301043
www.generalfire.it

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Fax: 0471/981127
www.vetribagno.com

2.1.4 Dry Pipe Valves

The following manufacturers provide valves for dry pipe sprinkler systems that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430

Fax: 0471/981127
www.vetribagno.com

KSB ITALIA S.p.A.
viale Tunisia, 46
20214 Milano
Tel: 02-6274-3273
Fax: 02-6698-3272

VALVOSTEEL s.r.l.
via dei Mille, 7
20098 San Giuliano Milanese
Tel: 02-9849-0956
Fax: 02-9840-169

RAIMONDI VALVOLE S.p.A.
via Castellana, 47
20027 Rescaldina - Milano
Tel: 0331-575111
Fax: 0331-464772

2.1.5 Water Motor Alarm

The following manufacturers provide water motor alarms that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Fax: 0471/981127
www.vetribagno.com

2.1.6 Pressure Switch

The following manufacturers provide pressure switches that generally comply with these specifications:

CAMI srl
Via Alessandrini, 2
20090 Trezzano Sul Naviglio (MI)
Tel: 02/48400166
Fax: 02/48401905
www.cami-it.com

BARKSDALE/PRECISION FLUID CONTROLS srl
Via Santa Rita da Cascia, 33

20143 Milano
Tel: 02/89159270
Fax: 02/89159271
e-mail:pfcit@tin.it

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

2.1.7 Low Air Pressure Supervisory Switch

The following manufacturers provide low air pressure supervisory switches that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Fax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.8 Wall and Riser Mounted Air Compressor

The following manufacturers provide wall and riser mounted air compressors that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.9 Tank Mounted Air Compressor

The following manufacturers provide tank mounted air compressors that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

COSTRUZIONI MECCANICHE COMPRESSORI srl
Via Gastaldi, 7/A
43100 Parma - Italia
Tel: 0521 607466
Fax: 0521 607394
www.cmcparma.it-cmc@cmcparma.it

2.1.10 Pipe Hangers and Supports

The following manufacturers provide components and materials for pipe hangers and support systems that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Fax: 0471/981127
www.vetribagno.com

PROSYSTEM
Via dell'Industria, 2
30031 Arino di Dolo (VE)
Tel: 041/5101622
Fax: 041/5131351
www.prosystemitalia.com

VIKING ITALIA srl (KING SYSTEM)
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.11 Valves

The following manufacturers provide valves for sprinkler systems that generally comply with these specifications:

MARIANI RUBINETTERIE
Via Valduggia, 12
13011 Borgosesia (VC)
Tel: 0163/23368
Fax: 0163/27900
www.marianirubinetteria.it

VALVOTUBI IND S.r.l.

Via M. Monti, 30/B
48100 Ravenna - Italy
Tel: 544/452279
Fax: 544/451148

KSB ITALIA S.p.A.
viale Tunisia, 46
20214 Milano
Tel: 02-6274-3273
Fax: 02-6698-3272

VALVOSTEEL s.r.l.
via dei Mille, 7
20098 San Giuliano Milanese
Tel: 02-9849-0956
Fax: 02-9840-169

RAIMONDI VALVOLE S.p.A.
via Castellana, 47
20027 Rescaldina - Milano
Tel: 0331-575111
Fax: 0331-464772

2.1.12 Backflow Preventers

The following manufacturers provide backflow preventers for sprinkler systems that generally comply with these specifications:

T.F. PIPING
Via Anicio Paolino, 6
00178 Roma
Tel: 06/7809997
Fax: 06/7801719
www.tfpiping.com

BRANDONI S.p.A.
Via Novara, 199
28078 Romagnano Sesia (NO)
Tel: 0163/828111
Fax: 0163/834458
www.brandoni.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

CAZZANIGA S.p.A.
Via Parcco
20046 Biazzono (MI)
Tel: 039-36321
Fax: 039-3632222

INTERMES S.p.A.
Via Bellini, 30
20095 cusano Milanino (MI)
Tel: 02-6195726
Fax: 02-6194247

2.1.13 Valve Supervision

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

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Fax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.14 Identification Signs

The following manufacturers provide identification signs that generally comply with these specifications:

SETON ITALIA S.r.l.
Via Lazzaroni, 7
21047 Saronno - VA
Tel: 02-96703198
Fax: 02-96703644
www.seton.it

S.I.S.A.S. S.r.l.
Via Sputnik, 8
06074 Ellera Scalo _ Corciano (PG)
Tel: 075/518641
Fax: 075/5186432
www.sisas.it

2.1.15 Buried Sprinkler Pipe and Fittings

The following manufacturers provide components and materials for buried sprinkler pipe and fittings systems that generally comply with these specifications:

SERTUBI
Via K.L. Von Bruck, 32
34143 Trieste

Tel: 040/3173111
Fax: 040/3173297
www.sertubi.com

SAINT-GOBAIN CONDOTTE
Via Romagnoli, 6
20146 Milano
Tel: 02/42431
Fax: 02/4895 3780
www.isover.it

OPPO Gesuino
Via Amerigo Vespucci, 1
09074 Ghilarza (OR)
Tel: 0785/54642
www.oppo.it

2.1.16 Buried Sprinkler Valves

The following manufacturers provide valves for buried sprinkler systems that generally comply with these specifications:

MARIANI RUBINETTERIE
Via Valduggia, 12
13011 Borgosesia (VC)
Tel: 0163/23368
Fax: 0163/27900
www.marianirubinetterie.it

T.F. PIPING
Via Anicio Paolino, 6
00178 Roma
Tel: 06/7809997
Fax: 06/7801719
www.tfpiping.com

2.1.17 Post Indicator Valves

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

TUBI GHISA
Direzione: Via E. Romagnoli, 6
20146 Milano
Tel: 02/42431
Stabilimento: via Allegro, 1
16016 Cogoleto (GE)
Tel: 010/91711
Fax: 010/9171401

RIP Rubinetterie Industriali Piemontesi S.p.A.
Via Reycend, 10
10148 Torino
Tel: 011/2203444

Fax: 011/2165981

LA POLITERMICA
via Macello, 51
39100 Bolzano
Tel: 0471-971430
Fax: 0471-981127
www.vetribango.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.18 Valve Boxes

The following manufacturers provide valve boxes that generally comply with these specifications:

TUBI GHISA
Direzione: Via E. Romagnoli, 6
20146 Milano
Tel: 02/42431
Stabilimento: via Allegro, 1
16016 Cogoleto (GE)
Tel: 010/91711
Fax: 010/9171401

RIP Rubinetterie Industriali Piemontesi S.p.A.
Via Reycend, 10
10148 Torino
Tel: 011/2203444
Fax: 011/2165981

2.1.19 Buried Utility Warning and Identification Tape

The following manufacturers provide components and materials for buried utility warning and identification tape for sprinkler systems that generally comply with these specifications:

SETON ITALIA S.r.l.
Via Lazzaroni, 7
21047 Saronno - VA
Tel: 02-96703198
Fax: 02-96703644
www.seton.it

S.I.S.A.S. S.r.l.
Via Sputnik, 8
06074 Ellera Scalo _ Corciano (PG)
Tel: 075/518641
Fax: 075/5186432

2.2 ABOVEGROUND PIPING SYSTEMS

Provide fittings for changes in direction of piping and for connections. [Make changes in piping sizes through tapered reducing pipe fittings; bushings will not be permitted.] Perform welding in the shop; field welding will not be permitted. Conceal piping in areas with [suspended ceiling] [and] [_____].

2.2.1 Sprinkler Piping

NFPA 13, UNI EN 1057, UNI 5336, UNI 6363/FA-199, UNI 8863/FA-1, and UNI 9489, except as modified herein. [Steel piping shall be Schedule 40 for sizes less than 80 mm, and may be Schedule 10 for sizes 80 mm and larger.] Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 40 mm and larger. Fittings shall be UNI EN 545, UNI EN 1254-1, UNI EN 1254-2, UNI 2223, and UNI EN 10242/A1, or UL FPED listed for use in dry pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Steel piping with wall thickness less than Schedule 40 shall not be threaded. Steel piping shall be galvanized. [Sprinkler pipe and fittings shall be metal.] Side outlet tees shall not be permitted.

2.2.2 Sprinkler Heads

Provide nominal 15 mm [or 20 mm] orifice [standard] [quick] [_____] response sprinkler heads. No o-rings will be permitted in sprinkler heads. Release element of each head shall be of the [ordinary] [intermediate] [_____] temperature rating or higher as suitable for the specific application. Provide polished stainless steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings. [Provide corrosion-resistant sprinkler heads and sprinkler head guards as required by NFPA 13, UNI 9489 and UNI EN 12259-1.] Automatic sprinklers installed in the pendent position shall be of the dry-pendent type [except that standard pendent sprinklers may be installed on return bends when both the sprinklers and the return bends are located in a heated area].

2.2.3 Cabinet

Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to each dry pipe valve. The number and types of extra sprinkler heads shall be as specified in UNI 9489 and NFPA 13.

2.2.4 Dry Pipe Valves

Provide valve complete with accessories and appurtenances for the proper operation of the system.

2.2.5 Water Motor Alarms

UNI EN 12259-4. Provide alarms of the approved weatherproof and guarded type, to sound locally on the flow of water in each corresponding sprinkler system. Mount alarms on the outside of the outer walls of each building at a location as directed. Provide separate drain piping directly to exterior of building.

2.2.6 Pressure Switch

Provide switch with circuit opener or closer for the automatic transmittal of an alarm over the facility fire alarm system. Connection of switch shall be under Section [13851, "Exterior Fire Alarm System"] [13852, "Interior Fire Detection and Alarm System"]. Do not install a shutoff valve in the piping between the dry pipe valve and any pressure switch.

2.2.7 Low Air Pressure Supervisory Switch

Provide switch for each sprinkler system and connect to building fire alarm system to activate the system supervisory alarm when air pressure in system drops halfway from the normal pressure to the tripping point. Connection of switch shall be under Section [13852, "Interior Fire Detection and Alarm System"] [____]. Provide a bleeder valve in the air line ahead of the switch for testing operation of the switch. The valve shall be normally open. Closing the valve shall shut off the air supply to the switch and exhaust the pressure between the switch and valve.

2.2.8 Air Compressor

2.2.8.1 Wall or Riser Mounted Air Compressor

Provide an approved, automatic type, electric motor-driven air compressor including pressure switch and air piping. Compressor shall have a minimum capacity capable of charging the complete sprinkler to normal system air pressure within 30 minutes. Provide an approved automatic air maintenance device for each system. Air compressor shall be either wall mounted or dry pipe riser mounted.

2.2.8.2 Tank Mounted Air Compressor

Provide an approved, automatic type, electric motor-driven air compressor including pressure switch, air piping, and [38] [____] liter minimum capacity tank. Compressor shall have a minimum capacity capable of charging the complete sprinkler system to normal system air pressure within 30 minutes. Provide an approved automatic air maintenance device for each system.

2.2.9 Pipe Hangers and Supports

Provide in accordance with NFPA 13, UNI 9489, UNI 5311, and UNI 7145. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood

with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor.

**NOTE: Sprinkler coverage is prohibited from
elevator hoistways, machine rooms and machinery
spaces by Italian regulations.**

2.2.10 Valves

NFPA 13, UNI 9489, UNI 6884, and UNI 7125/FA-109. Provide valves of types approved for fire service. Valves shall open by counterclockwise rotation.

Provide [a rising stem] [an OS&Y] [a wall indicator] valve beneath each dry pipe valve. [Check valves shall be [flanged] clear opening swing-check type valves with flanged inspection and access cover plate for sizes [100] [200] mm [_____] and larger.]

2.2.10.1 Backflow Preventers

Provide double check valve assembly backflow preventer with OS&Y gate valve backflow preventer with OS&Y gate valve on both ends. Each check valve shall have a drain. Backflow prevention assemblies shall be provided in accordance with UNI 9157. Provide downstream of the backflow prevention assembly listed hose valves with 64 mm National standard male hose threads with cap and chain. Provide one valve for each 16 l/s of system demand or fraction thereof. Provide a permanent sign in accordance with paragraph entitled "Identification Signs" which reads, "Test Valve" in both English and Italian languages.

2.2.10.2 Valve Supervision

Provide supervision of each control valve against closure and tampering in accordance with NFPA 13. [Provide switch with SPDT (Form C) dry contacts for the automatic transmittal of a supervisory signal over the facility fire alarm system; minimum switch contact rating shall be 2.5 amperes at 24 VDC. A supervisory signal shall be initiated during the first two revolutions of the hand wheel, or during the first 1/5th of travel distance of the valve stem, from the full open position. Connection of the switch shall be under Section [13852, "Interior Fire Detection and Alarm System"] [13855, "Analog/Addressable Interior Fire Alarm System"].] [Provide breakaway key operated locks and steel chains to secure all control valves against unauthorized closure or tampering.]

2.2.11 Identification Signs

NFPA 13. Attach properly lettered and approved metal signs to each valve and alarm device. [Permanently affix hydraulic design information sign to the riser of each system.] For pipe schedule systems, provide a hydraulic design information sign stating: This is a [light] [ordinary] [extra] hazard pipe schedule system.

2.2.12 Inspector's Test Connection

Provide test connections approximately 2 meters above the floor for each sprinkler system or portion of each sprinkler system equipped with an alarm device; locate at the hydraulically most remote part of each system. Provide test connection piping to a location where the discharge will be readily visible and where water may be discharged without property damage. Provide discharge orifice of same size as corresponding sprinkler orifice. Provide a precast concrete splash block under each exterior discharge orifice.

2.2.13 Main Drains

Provide separate drain piping [to discharge at safe points outside each building] [to sight cones attached to drains of adequate size to readily receive the full flow from each drain under maximum pressure.] [The penetration of the exterior wall shall be no greater than [0.61 meters] [_____] [above finished grade.]] Provide auxiliary drains as required by UNI 9489 and NFPA 13. Provide precast concrete splash blocks under each exterior drain discharge.

NOTE: Contact the fire department legally obligated to protect the facility to find out what their specific are.

2.2.14 Fire Department Connections

Provide [100] [_____] mm single [Storz] [_____] type connections approximately one meter above finish grade, of the approved two-way type in accordance with UNI 9489 and UNI 9490 with 65 mm National standard female hose threads with brass caps, chain, and identifying fire department connection escutcheon plate.

2.3 BURIED WATER PIPING SYSTEMS

NOTE: Minimum depth of cover must comply with NFPA 24 for the specific area of the project.

2.3.1 Pipe and Fittings

Provide outside-coated, cement-mortar lined, ductile-iron pipe, and fittings conforming to NFPA 24, UNI 9489, UNI ISO 4179, and UNI EN 545 for piping under the building and outside of building walls. Anchor joints in accordance with NFPA 24 and UNI 9489. Provide concrete thrust block at the elbow where the pipe turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Minimum pipe size shall be 150 mm. Minimum depth of cover shall be [_____] [one meter] at finish grade. [Piping beyond 1.50 meters outside of building walls shall be provided under Section 02510, "Water Distribution."]

2.3.2 Valves

Provide as required by NFPA 24 and UNI 9489. Gate valves shall conform to UNI 6884 and UNI 7125/FA-109 and shall open by counterclockwise rotation.

2.3.3 Post Indicator Valves

Provide with operating nut located about one meter above finish grade. Gate valves for use with indicator post shall conform to UNI 6884, UNI 7125/FA-109. Indicator posts shall conform to UL 789. Provide each indicator post with one coat of primer and two coats of red enamel paint.

2.3.4 Valve Boxes

Except where indicator posts are provided, for each buried valve, provide cast-iron, ductile-iron, or plastic valve box of a suitable size. Plastic boxes shall be constructed of acrylonitrile butadiene styrene (ABS) or inorganic fiber-reinforced black polyolefin. Provide cast-iron, ductile-iron, or plastic cover for valve box with the word "WATER" cast on the cover. The minimum box shaft diameter shall be 133 mm. Coat cast-iron and ductile-iron boxes with bituminous paint applied to a minimum dry-film thickness of 0.254 mm.

2.3.5 Buried Utility Warning and Identification Tape

Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 80 mm minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall read "CAUTION BURIED WATER PIPING BELOW" or similar wording in both English and Italian languages. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.4 PIPE SLEEVES

Provide where piping passes entirely through walls, floors, and roofs. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs. Provide 25 mm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of the sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with approved fire-proofing fill, void, or cavity material.

- a. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: Provide hot-dip galvanized steel, ductile-iron, or cast-iron sleeves. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are grouted smooth.

- b. Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs: Provide 0.56 mm galvanized steel sheet.

2.5 ESCUTCHEON PLATES

Provide split hinge metal plates for piping entering walls, floors, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces. Provide paint finish on metal plates in unfinished spaces.

PART 3 EXECUTION

3.1 INSTALLATION

Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13, UNI 9489, UNI 9490, UNI EN 12259-1, UNI EN 12259-2, UNI EN 12259-3, and UNI EN 12259-4, except as modified herein. Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings. Keep the interior and ends of new piping and existing piping affected by Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter. Inspect piping before placing into position. Provide Teflon pipe thread paste on male threads.

3.1.1 Electrical Work

Provide electrical work associated with this section under Section 16402, "Interior Distribution System," except for control [and fire alarm] wiring. [Provide fire alarm system under Section 13852, "Interior Fire Detection and Alarm System."] Provide control [and fire alarm] wiring, [including connections to fire alarm systems,] under this section in accordance with CEI 64-8/V1/V2. Provide wiring in rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

3.1.2 Disinfection

Disinfect the new water piping and existing water piping affected by Contractor's operations up to the [bottom flange of the dry pipe valve] [backflow prevention device] in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 milligram per kilogram (mg/kg) of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 mg/kg, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit results prior to the new water piping being placed into service. Disinfection of systems supplied by nonpotable water is not required.

3.1.3 Connections to Existing Water Supply Systems

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around the main piping; bolt valve to the branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, all without interruption of service. Notify the Contracting Officer in writing at least [_____] [15] days prior to connection date; receive approval before any service is interrupted. Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labor as required. [Furnish] [Government will furnish only] the labor and the tapping or drilling machine for making the actual connections to existing systems. [All piping shall be photographed prior to burying, covering, or concealing.]

3.1.4 Buried Piping System

Bury tape with the printed side up at a depth of 305 mm below the top surface of earth or the top surface of the subgrade under pavements.

3.1.5 Field Painting

[Painting of sprinkler systems above suspended ceilings and in crawl spaces is not required.] Clean, prime, and paint new sprinkler system piping, valves, hangers, accessories, and miscellaneous metal work as specified [in Section 09900, "Paints and Coatings"]. Exercise care to avoid painting sprinkler heads and operating devices. Upon completion of painting, remove materials which were used to protect sprinkler heads and operating devices which have been inadvertently painted and provide new clean sprinkler heads and operating devices of the proper type. Finish primed surfaces as follows:

3.1.5.1 Systems in Finished Areas

Finished areas are defined as areas where walls or ceilings are painted or are constructed of a prefinished material. Paint primed surfaces with two coats of paint to match adjacent surfaces, except paint valves and operating accessories with two coats of gloss red enamel. [Provide piping with 50 mm wide red bands spaced at maximum 6 meter intervals throughout the piping system. Bands shall be gloss red enamel or self-adhering plastic.]

[3.1.5.2 Systems in Unfinished Areas

Paint piping in valve rooms, [and] mechanical rooms, [and] [attics] [and] [crawl spaces] with gloss red enamel applied to a minimum dry film thickness of 0.04 mm, as specified in Section 09900, "Paints and Coatings".

]3.2 FIELD QUALITY CONTROL

Perform test to determine compliance with the specified requirements in the presence of the Contracting Officer. Test, inspect, and approve piping before covering or concealing.

3.2.1 Preliminary Tests

Hydrostatically test each system at 345 kPa (gage) above normal system static pressure or 1379 kPa (gage), whichever is greater, for a 2-hour period with no leakage or reduction in pressure. Flush piping with potable water and air test each system in accordance with NFPA 13 and UNI 9489. Piping above suspended ceilings shall be tested, inspected, and approved before installation of ceilings. Test the alarms and other devices. Test the water flow alarms by flowing water through the inspector's test connection. Water shall be delivered to the system test connection in not more than 60 seconds, starting at the normal air pressure on the system and at the time of a fully opened inspection test connection. When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in NFPA 13.

3.2.2 Formal Tests and Inspections

Do not submit a request for formal test and inspection until the preliminary test and corrections are completed and approved. Submit a written request for formal inspection at least [_____] [15] days prior to inspection date. An experienced technician regularly employed by the system installer shall be present during the inspection. At this inspection, repeat any or all of the required tests as directed. Correct defects in work provided by the Contractor, and make additional tests until the systems comply with contract requirements. Furnish appliances, equipment, [water,] electricity, instruments, connecting devices, and personnel for the tests. [The Government will furnish water for the tests.] EFAMED, Naval Facilities Engineering Command, Fire Protection Engineer, will witness formal tests and approve systems before they are accepted.

-- End of Section --