UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SPECIFICATION FOR PROCUREMENT OF WATER-LEVEL SENSING INSTRUMENTATION, SPECIFICATION NUMBER HIF-I-1

by D.H. Rapp

Open-File Report 82-89

NSTL Station, Mississippi

January 1982

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For more information write to:

Chief, Hydrologic Instrumentation Facility
U. S. Geological Survey, WRD
Building 2101
NSTL Station, MS 39529

CONTENTS Page

TABLES

Specification for Procurement of Water-Level Sensing Instrumentation Specification Number HIF-I-1

INTRODUCTION

The performance of the U.S. Geological Survey's mission requires the installation of water-level sensing instrumentation at many diverse river, canal, lake, storm-sewer, and observation-well sites. Currently, stilling wells with float and counter weight, or gas purge servo-manometer systems are used to sense water level (stage). A number of hydrologic instrumentation manufacturers have developed alternative methods to sense stage. Stage can be detected by pressure-transducer systems and by sonic, or ultrasonic transducer and receiver systems. Some of these recent developments, especially the noncontact sensing systems, could reduce installation costs at suitable sites and may have lower maintainance costs.

Both the new systems and those currently in use by the Survey will be tested at the Hydrologic Instrumentation Facility to see if they meet Survey requirements for the collection of stage data. This report sets forth only the minimum Survey requirements for stage-sensing systems for the purpose of conducting qualification tests. Each Survey office will have to determine complete requirements for each field location, but the following requirements will cover the majority of sites. All stage-sensing systems will be tested before procurement by the Hydrologic Instrumentation Facility. The results of these tests will be published in a separate report for use by Survey personnel. Systems that pass the qualification tests will be placed on the Survey's Qualified Products List (QPL).

The Code of Federal Regulations (Title 41) allows the procurement office to require prospective bidders to have their product tested and qualified for the QPL before bids are submitted in response to a solicitation for bids. After a QPL is established, only bidders for stage-sensing instrumentation whose products have met the requirements in this report will be invited to bid.

The Regulations require this specification report in advance of the qualification tests. The following six sections are in the format used by the General Services Admininstration and the Department of Defense.

Section 1 defines the stage instrumentation that this specification report covers. Also, Section 1 classifies the various system characteristics in outline form as an aid to Survey personnel purchasing these systems. References used in Sections 3-6 are listed in Section 2. These references are nationally recognized standard test procedures used by industry and government. Stage-sensing system requirements are listed in Section 3. These are the minimum requirements that must be met by each system before it will be approved for procurement by the Survey. Section 4 covers quality-assurance (QA) provisions, including the qualification tests. The manufacturer is responsible for QA inspections and tests. The qualification tests will be conducted by Survey personnel at the Hydrologic Instrumentation Facility or by an independent test laboratory under contract with the Survey.

Section 5 lists the standard packing instructions for delivery, in case this specification report is used as a part of a procurement contract document. The last section of the specification is Section 6, which describes ordering information for purchasers of qualified products, and qualification information for suppliers and manufacturers.

This specification report serves to communicate to the manufacturers of hydrologic instruments and to Survey procurement personnel the Survey's minimum requirements for stage-sensing systems.

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

SPECIFICATION INSTRUMENTATION, WATER-LEVEL SENSING

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers instrumentation for sensing the elevation of the water surface in open channels, rivers, lakes, reservoirs, storm-sewer pipes, and observation wells at U.S. Geological Survey gaging sites. Water-surface levels, hereafter will be called stage. A stage-sensing instrument system as defined by this specification shall be a complete system from the sensor to the required output. The system shall include the stage sensor, all electronic, mechanical, and/or hydraulic subsystems, all interface systems, all hardware items, cables, hoses, chain drives, sprockets, timers, controllers, software and instrument cases to meet all the requirements listed in Section 3. The signal output of this sensing system (mechanical or electrical) shall meet the signal input requirements of analog to digital recorders (ADR), digital input recorders, and graphic recorders listed in section 3. Many of the gaging sites where these instruments are installed are at remote locations and will be visited only once every 6 to 12 weeks with 75 days as the minimum requirement between visits. The systems must be capable of operating in an instrument shelter that is not heated in the winter nor air conditioned in the summer.

1.2 Classification. Stage-sensing instrumentation under this specification shall be classified by all the following characteristics:

1. Contact or noncontact system
2. Sensor, type and distance
3. Error
4. Maximum range in stage
5. Suspended sediment concentration
6. Water surface
7. Power requirement
8. Instrument package size and weight
9. System data output signal

1.2.1 Contact or noncontact systems. All systems that have stilling well pipes or sensors in or on the water surface are classified as contact systems. All systems that have sensors and all hardware mounted above the maximum measured water surface are classified as noncontact systems.

1.2.2 Sensor type and distance. Sensors are classified by type as follows:

1.2.2.1 Type.

Float and counterweight

Gas purge, mercury manometer

Gas purge, mechanical manometer (that is, balance-beam type)

Pressure transducer

Sonic or ultrasonic transducer and receiver

Electromagnetic spectrum sensors (that is, lasers, electro-optical,RF)

Electronic sensor cable (that is, resistance cable)

Other

1.2.2.2 Distance. The distance that a sensor can be located away from the rest of the stage-sensing system is classified by either the maximum allowable length of sensor cable or maximum length of air line when no cables are required, as follows:

10 Feet
25 Feet
50 Feet
100 Feet
500 Feet
1000 Feet
+ 1000 Feet

1.2.3 Error. Allowable output error is defined in Section 3. Overall stage-sensing system error, in feet, is classified by one of the following error-range groups for full range (full scale) in stage and for all environmental conditions (Section 3): A, 0.001 to 0.005; B, 0.006 to 0.01; C, 0.02 to 0.10; D, 0.11 to 0.25; E, 0.26 to 0.49; and F, 0.50 to 1.00.

1.2.4 Range in stage. The maximum ranges (full scale) in stage, in feet, are as follows: 0 to 10, 0 to 20, 0 to 35, 0 to 50, 0 to 100, 0 to 200, and + 200.

1.2.5 Suspended-sediment concentration. The stage-sensing system will be classified by the range in suspended-sediment of the water. The system shall be capable of sensing stage within the allowable output error requirements. The range normally found is from 0 to 100,000 milligrams per liter particle concentration with a density of 2.65 specific gravity of quartz particles, and a particle size diameter of d50 = 0.10 mm (1/2 mm maximum).

1.2.6 Water surface. The water surface will be from level and smooth surface (laminar flow) to 8.0 foot standing waves (supercritical and turbulent flow). Surface velocity will be from 0 to 40 feet per second. The surface, at times, may be covered with an oil film, foam, floating debris, or ice cover.

1.2.7 Power requirements. Power required to operate the sensing system, including interface, if required, is classified as battery alone, a-c power, or a-c power with battery backup. See Section 3 for details of maximum acceptable power requirements.

1.2.8 Instrument package size and weight. The space requirements to house the instrument system including interface hardware, nitrogen gas tanks, pressure system, power supply, and batteries are classified as follows:

A. Smaller than 18 inches long, by 12 inches wide by 18 inches high, and weighs less than 25 pounds.

B. Larger than size A, but smaller than 36 inches long by 18 inches wide by 36 inches high, and weighs less than 50 pounds.

C. Larger than size B, but smaller than 4.0 feet long by 3.0 feet wide by 8.0 feet high, and weighs less than 75 pounds.

D. Larger than size C, and/or weighs more than 75 pounds.

The weight excludes the weight of a full nitrogen gas tank for all four classes.

1.2.9 System data output. Signal output is classified either as analog or digital signal. The analog output can be either a mechanical shaft input, or a voltage.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Standards:

Fed. STD. NO. 123 - Marking for Domestic Shipment (Civil Agencies).

Fed. STD. No. 151 - Federal Test Methods.

(Copies of Federal Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring office or as directed by the contracting officer).

Military Standards:

MIL-STD-901C, Shock Test, HI (High Impact), Shipboard machinery.

MIL-STD-167B, Mechanical Vibration of Shipboard Equipment.

MIL-STD-202F, Test Methods for Electronic and Electrical Component Parts.

MIL-I-46058C, Type UR, Conformal Coating Requirements.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Electrical Code, National Fire Protection Association, 1981 Edition. (Copies may be obtained from the National Fire Protection Association, Inc., 470 Atlantic Avenue, Boston, MA 02210.)

National Weather Service, Transient Susceptibility Standard, May 1978.

National Environmental Testing Criteria and Recommended Test Methodologies for Proposed Standard for National Weather Service Equipment, September, 1980.
(Copies may be obtained from the National Weather Service, Test and Evaluation Division, National Oceanic and Atmospheric Administration, Rt. 1, Box 105, Sterling, VA 22170.)

3. REQUIREMENTS

3.1 System output requirements. The stage-sensing system shall include interface hardware that will input the correct signal to one or more of the recorders,[1/] listed below, unless otherwise specified in the contract or purchase order. The input signal to the recorder shall be in the proper format so that the stage data shall be in units of feet. System output resolution shall be 0.01 foot over full scale range for all error-range groups except group A. Resolution shall be 0.001 for group A systems. The stage-sensing system shall display the output value in digital format on demand of the servicing personnel.

3.1.1 Fischer and Porter shaft-input, analog to digital, paper-punch tape recorder, Model 1542.

3.1.2 Leupold and Stevens shaft-input analog to digital, paper-punch tape recorder, Model 7001.

3.1.3 Leupold and Stevens digital input/output, paper-punch tape recorder, Model 7041.

3.1.4 Leupold and Stevens shaft-input, graphic recorder, Model A 71 or Model A 35.

3.2 Interface requirements. The interface shall include all required cables and connectors, pulleys, chains, belts, power supplies, reference voltage batteries, and any other items required to connect the stage-sensing system to one or more of the recorders listed under Section 3.1. All electrical cables shall have polarized connectors or clearly marked terminal identification.

1/ Use of trade names and trademarks in this report is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

3.3 Materials. All parts of the system shall be fabricated from materials which will resist corrosion under humidity and resist deterioration by solar radiation (section 3.6). All circuit boards and electronic components shall be protected by Type UR Conformal Coating from internal moisture and condensation per MIL-I-46058C.

3.4 Housing and connectors. The system shall be housed in a drip-proof, dust-proof, shock-resistant, and waterproof case or cases. All cover plates, lids, and removeable plugs shall be either hinged or tethered so they can not be dropped accidently. Lock washers or lock nuts shall be required on screws and bolts to prevent loosening by vibration. All external electrical connectors shall be watertight and shall not loosen by vibration.

3.5 Operational manual. Operational manuals for the complete system (including the interface) shall be provided. These manuals are for use by U.S. Geological Survey field personnel and shall contain the following procedures and items:

1. General description
2. Installation instructions
3. Calibration procedures
4. Operation instructions
5. Maintenance instructions
6. Trouble shooting and repair guide
7. Schematic and wiring diagrams
8. Complete parts list
9. Pictorial exploded assembly drawing with all parts identified
10. Manufacturer's design specifications
11. Factory service information

3.6 Environmental conditions. The instrument package excluding the sensors and the Analog to Digital Recorders (ADR's) shall be housed in an U.S. Geological Survey instrument shelter that is not heated in the winter nor air conditioned in the summer. The system including the sensor shall operate throughout the range of environmental conditions as follows:

3.6.1 Temperature. Air and water temperatures as follows:

3.6.1.1 Air temperature. From -40°C (-40°F) to 60°C (140°F).

3.6.1.2 Water temperature. From -5°C (20.6°F) to 50°C (122°F).

3.6.2 Relative humidity. From 0 to 100 percent, condensing.

3.6.3 Pressure. From 890 millibar (26.3 in) to 1063 millibar (31.4 in).

3.6.4 Elevation. From -280 feet (Death Valley, Calif.) to 12,000 feet above National Geodetic Vertical Datum of 1929.

3.6.5 Biological fouling. Fouling (plant and animal) and corrosion must meet the requirements specified in test method 811.1 of Fed-STD-151 for corrosion.

3.6.6 Electromagnetic and electrical disturbances. Lightning and other sources of disturbances on powerline, signal line, and electrostatic discharge transients as specified in tests in Section 4.

3.6.7 Airborne sand and dust. 5.0 mg/ft^3 concentration, 74 to 1000 micometers, dust and sand particle size, 3 to 24 mi/h windspeed, and temperature from 23°C (74°F) to 63°C (145°F).

3.6.8 Silt and sand deposits. There can be as much as 0.25-foot deposit of wet silt and sand on top of any sensors placed under the water surface.

3.6.9 Water chemistry. The water pH ranges from 3.5 to 10.5 units. The water conductivity from 5 to 20,000 micromhos per centimeter at 25°C.

3.6.10 Precipitation. Rainfall from 0.1 to 6.0 in/h which can be freezing in winter climates and snowfall from 0.1 to 4.0 in/h.

3.6.11 Solar Radiation. 90 to 115 w/ft^2 insolation with 4.7 to 6.4 w/ft^2 ultraviolet radiation.

3.6.12 Shock, vibration, and noise. The system must be capable of passing MIL-STD-901C and MIL-STD-167B tests. Also the system's output shall not be altered by noise from highway or railroad traffic. The system will be housed in a shelter attached to a highway or railroad bridge. The non-contact type sensor will be attached directly to the bridge.

3.6.13 Plugged orifice condition. In a gas purge system, an automatic pressure relief and reset device is required to protect the system from damage if the orifice becomes restricted or plugged. Mercury systems shall have an overflow reservoir to prevent loss of mercury.

3.7 Storage and transit conditions. The system must be capable of surviving long periods (as much as 24 months) in storage and transport modes and be capable of functioning within specifications when put into the operating mode. The system shall not be damaged when subjected to the following environmental conditions while in storage and/or transport.

3.7.1 Ambient air temperature. From -60°C (-76°F) to 71°C (160°F).

3.7.2 Humidity. From 0 to 100 percent, condensing.

3.7.3 Pressure. From 750 millibar (26.3 in.) to 1063 millibar (31.4 in).

3.7.4 Shock and vibration. Per MIL-STD-901C and MIL-STD-167B.

3.8 Initial calibration. If calibration is required, the stage-sensing system and interface shall be designed to be initially calibrated during installation at the gaging station, by no more than two Survey hydrologic technicians using only a portable 3 1/2 digital volt ohm meter (DVOM) and hand tools. No other electronic test instruments or special power supplies shall be required.

3.9 Recalibration. Intervals between required recalibrations shall not be shorter than 180 days and shall require only one Survey technican with only a portable 3 1/2 DVOM and hand tools.

3.10 Allowable error. Error in stage output is defined as the difference between the true water-surface height above a given datum and that measured simultaneously by the stage-sensing system. The error in the independent measurements (for example, the hook-gage readings) of stage shall be within $\pm$ 0.005 feet for error groups B to F and $\pm$ 0.001 for group A. Errors caused by non-linear response or drift with time over the period of testing that change the error classification to a lower error range group shall be grounds for classification at the lowest error range group determined by various qualification tests. Maximum range in stage (full scale) and the maximum allowable error is as follows in table I for daily discharge stations and table II for special-case stations. A stage-sensing system shall be unacceptable for qualification if more than 2.50 percent of all check measurements of stage exceed the maximum allowable error listed in table II. In a period of 60 days of controlled laboratory tests at least 100 check measurements of stage will be made. These measurements will be distributed throughout the range of temperature and other Section 4 tests.

TABLE I. Systems Accuracy for Daily Discharge Stations

Range in stage (feet)	Maximum allowable error 1/ (feet)
0-10	± 0.005
0-20	± 0.010
0-35	± 0.018
0-50	± 0.025
0-100	± 0.050
0-200	± 0.100
+ 200	± 0.100

1/ Full-scale error is 0.050 percent for all ranges of less than 200 feet.

TABLE II. Systems Accuracy for Special Case Stations

Range in stage (feet)	Maximum allowable error 2/ (feet)
0-10	± 0.050
0-20	± 0.100
0-35	± 0.180
0-50	± 0.250
0-100	± 0.500
0-200	± 1.000
+ 200	± 1.000

2/ Full-scale error is 0.50 percent for all ranges of less than 200 feet.

3.11 Frequency and duration of data output. The system's stage output shall be current within 5 seconds of the instantaneous value at the time that the ADR punches. The user shall be able to select the frequency of the ADR punch. The frequencies shall be 1, 2, 5, 6, 15, 30, or 60 minutes. If the system is designed to shut down between outputs to conserve power, the duration of each output period shall be a minimum of 25 $\pm$ 1.0 seconds to allow recording by the ADR. If necessary the system shall turn on in advance of the ADR recording interval to insure a stable output and be synchronized with the ADR timer.

3.12 Power system requirements. The following requirements apply to all types of power systems. All power connections shall have polarized connectors and terminal polarity clearly marked. Where terminal strip connectors are used, accidentally reversed connections shall not cause any damage to the system. All fuses and/or circuit breakers shall be mounted on the outside of the instrument case at an accessible location next to the control switches or display panel. They must be sealed so that moisture and water cannot enter the instrument case. The electrical system shall meet all grounding requirements, wiring methods, and materials that are approved for swimming and fountain pools by the National Electrical Code (NEC) of the National Fire Protection Association. When a power supply interruption occurs, the system shall automatically restart within one second after the power is restored.

3.12.1 Voltage-reference batteries. If voltage-reference batteries are required, minimum required voltage output must exceed 180 days of continuous

service under the full range of environmental conditions. The battery must be a commerical product available from at least two different U.S. manufacturers.

3.12.2 Dry-cell batteries. If the system, including the interface, has dry-cell batteries, the batteries must provide power for satisfactory operation for at least 180 days of continuous service under the full range of environmental conditions. These batteries shall be standard 6-and/or 12-volt batteries with screw or plug-in terminals, and be a commercial product available from at least two different U.S. manufacturers.

3.12.3 Rechargeable batteries. If the system is equipped with rechargeable batteries, they must provide power for satisfactory operation of at least 75 days of continuous service under the full range of environmental conditions and these batteries shall be easily removed for recharging on a standard a-c charger for that type of battery. These batteries must be a commercial product available from at least two different U.S. manufacturers.

3.12.4 A-c power supply. If the system uses an a-c power supply it shall operate at a maximum of 10 amperes, at 120 volts ac, single phase 60 Hz.

3.12.5 A-c power-supply with rechargeable battery back-up. The a-c power supply shall have the same requirements as 3.12.4. The back-up rechargeable batteries shall be capable of running the system for 14 continous days without a-c power and must be available from at least two different U.S. manufacturers.

3.13 Installation. The system shall be designed so that two but no more than three Survey hydrologic technicans can carry it to the shelter and install the complete system using only hand electric-powered tools and hand tools in an existing appropriate sized gaging-station shelter.

3.14 Maintainability. The system shall be capable of unattended operation of periods of at least 75 continuous days. The system shall be designed so that routine maintenance and service procedures can be performed by one Survey technician on inspection visits. The frequency of required major maintenance procedures shall be no less than 365 days and require no more than two Survey technicians to perform the work.

3.15 Interchangeability. Major system components, interfaces, sensors, and all system modules shall be interchangeable, with like parts and must be available for purchasing from the stage-sensing system manufacturer and/or distributor.

3.16 Safety. The sensors signal output or any part of the system shall not create any safety hazard to the personnel or to the aquatic life. The sensors signal output systems shall create no undesirable signal or condition that is actually or potentially unhealthy to human, animal, or plant life. Maximum allowable electro-magnetic emission shall be the Federal limits for Class A computing device, Federal Communication Commission Rules, Part 15, Subpart J. No toxic or harmful materials are to be released to the environment.

3.17 Workmanship. The system shall be manufactured and finished in such a manner as to meet all the requirements specified herein and shall be free from characteristics or defects which affect the appearance, or which might affect the serviceability or render the system unsuitable for the intended use.

3.18 Qualification. Stage-sensing instrumentation purchased under this specification shall be a product that has been tested in accordance with the qualification test described in section 4 of this specification and has been listed on or approved for listing on the applicable Federal Qualified Products List.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for quality assurance inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all quality assurance (QA) inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the QA inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Qualification tests. Qualification tests shall consist of all performance tests specified in 4.3.

4.2.1 Place of qualification test. Qualification tests shall be conducted at a Government or a commercial laboratory designated by the Test and Evaluation Section, Hydrologic Instrumentation Facility, Water Resources Division, U.S. Geological Survey.

4.2.2 Sample size for qualification. The sample size for qualification shall be two production models for each classification submitted for qualification No prototype models will be accepted for qualification.

4.2.3 Test conditions. Test conditions to be used are described in detail in the two National Weather Service reports (Section 2).

4.3 Performance tests. The following tests will be performed.

4.3.1 Installation. The instrumentation system will be installed per manufacturer installation manuals by Survey technicians or by a government selected contractor. Unless otherwise specified, the test item shall be

installed in the test facility in a manner that will simulate service usage, making connections and attaching ADR and other instrumentation as necessary. Plugs, covers, and inspection plates not used in operation, but used in servicing shall remain in place. When mechanical or electrical connections are not used, the connections normally protected in service shall be adequately covered.

4.3.2 Test data. Test data shall include complete identification of all test equipment and accessories. The data shall include the actual test sequence used and the ambient test conditions recorded periodically during the test period. The test record shall contain a signature and data block for certification of the test data by the test engineer or techician.

4.3.3 Tests. Ambient temperature and relative humidity will be controlled to simulate outdoor conditions throughout the range of requirements listed in Section 3. The tests will subject the system to a total of 60 days of repeated winter weather cycles, summer weather cycles, and periods of constant temperature and relative humidity within Section 3 stated limits of the test conditions. The water surface will be varied throughout the specified range of stage and also held constant for periods of time.

4.3.4 Electrical disturbances. A-c power line transient susceptibility, will be tested in accordance with National Weather Service (NWS) Transient Susceptibility Standard, May, 1978: Test Level 1 with acceptance criteria 3.3(b) stated in the NWS Standard. Signal line transient susceptibility will be tested in accordance with NWS Transient Susceptibility Standard, May, 1978: Cross talk and lightning test with acceptance criteria 3.3(b) stated in the NWS Standard.

4.3.5 Period of time. The system will be tested over a period of 90 days, or longer if necessitated by longer than normal set-up time and/or time needed for repair of laboratory test equipment. The actual time of all the cyclic and static tests will not exceed sixty days for properly operating stage-sensing system submitted for qualification.

4.4 Qualification failure criteria. The system shall have failed the test when any of the following occur:

(1) Monitored functional parameters deviate beyond acceptable specification limits established in Section 3.

(2) Catastrophic or structural failure. The U.S. Geological Survey will not be responsible for damages to units which fail during tests.

(3) Mechanical binding or loose parts including screws, clamps, bolts, and nuts, that clearly result in component failure or a hazard to personnel safety.

(4) Malfunction.

(5) Degradation of performance beyond maximum allowable error specification requirements (Tables I & II).

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or Commercial as specified (see 6.1).

5.3 Marking. Unless otherwise specified (see 6.1), marking shall be in accordance with 5.3.1, 5.3.2, and 5.3.3.

5.3.1 Unit packages. Each unit package shall be plainly marked to indicate the name of the article, model number, serial number, dates of manufacture, contract number, and the quantity contained therein.

5.3.2 Intermediate packages. The intermediate packages shall be marked with the following, arranged in this order shown:

A. Item name.

B. Model number.

C. Quantity therein.

5.3.3 Shipping container. Each shipping container shall be marked in an upper right-hand corner on one side panel and one end panel with the following, arranged in the order shown:

A. Item name.

B. Item model number.

C. Quantity therein.

D. Contractor's name and address (and manufacturer's name and address, if different).

E. Contract and purchase or delivery order number.

F. Gross weight and cubic displacement (to the nearest 0.1 of a cubic foot). In addition, shipping containers shall be marked with appropriate exterior caution markings.

5.4 Unitization. When shipment to Government depots are full carload or truckload, the shipping containers shall be unitized to facilitate handling in accordance with normal commercial practice. The unitized load shall not exceed 2,500 pounds, in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

A. Title, number, and date of this specification.

B. Title, number, and date of any other applicable detailed specification.

C. Complete classification listing all characteristics (see Section 1.2.).

D. List any optional equipment covered by qualification.

E. Responsibility for inspection if other than specified (see 4.1).

F. First article quantity, if required.

G. Marking required if other than specified (see 5.3).

H. Specified packaging level (see 5.1).

6.2 Qualification information. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the U.S. Geological Survey, tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The agency responsible for the Qualified Products List is the U.S. Geological Survey, Water Resources Division, Hydrologic Instrumentation Facility, Test and Evaluation Section, Bldg. 2101, NSTL Station, MS 39529, and information pertaining to qualification of stage-sensing instrumentation may be obtained from the agency.

REFERENCES

1979, Code of Federal Regulation, Title 41, Public Contracts and Property Management, Chapter 1 p. 104-105

1978, Transient Susceptibility Standard, National Weather Service.

1980, National Environmental Testing Criteria and Recommended Test Methodologies for Proposed Standards for National Weather Service Equipment, National Weather Service.

HIF-I-1
ADMENDMENT -1
April 20, 1983

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

SPECIFICATION INSTRUMENTATION, WATER-LEVEL SENSING

This amendment, which forms a part of HIF-I-1, dated January 1982, is the specification used to establish a Qualified Products List (QPL) for water-level sensing instrumentation.

Page 5

Paragraph 1.2.2

DELETE: Sensor type and distance. Sensors are classified by type as follows:

ADD: Sensor: Sensors are classified as follows:

ADD: 1.2.2.3 Target area. The area of unobstructed water surface required by the sensor. The area is a function of sensor height above or below the water surface.

ADD: 1.2.2.4 Dead band. The distance above or below the sensor that the system does not operate satisfactorily.

Page 8

Paragraph 2.2

ADD: American National Standards (ANSI), Graphic Symbols for Electrical and Electronics Diagrams, ANSI Y32.2, 1975 and IEEE Std. 315, 1975.

Reference Designations for Electrical and Electronics parts and equipment, ANSI Y32.16, 1975 and IEEE Std. 200, 1975 (Copies may be obtained from The Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, N.Y. 10017).

Page 9

Paragraph 3.1

ADD: Line 6, "±" 0.01 foot ...

ADD: Line 7, "±" 0.001 for group A ...

ADD: 3.1.5 Synergetics GOES Hydrologic Data Collection Platform, Model 3400A-001/3451A.

ADD: 3.1.6 Any system furnished by a stage-sensing system manufacturer that will produce a printed copy in digital format on paper or paper tape.

Page 10

Paragraph 3.5

ADD: All operational manuals shall be written in English.

ADD: 7. (Symbols shall comply with ANSI Y32.2 and reference designations shall comply with ANSI Y32.16).

Page 11

Paragraph 3.6

DELETE: From the first sentence "and the Analog to Digital Recorders (ADR's)".

Paragraph 3.6.1.1

DELETE: From -40°C (-40°F) to 60°C (140°F)

ADD: Air temperature range must meet one of the following:

From -40°C (-40°F) to 65°C (149°F)
From -25°C (-13°F) to 65°C (149°F)
From 0°C (32°F) to 65°C (149°F)

PAGE 18

Paragraph 4.2.2

DELETE: Sample size for qualification. The sample size for qualification shall be two production models for each classification submitted for qualification.

ADD: Sample size for qualification. The sample size for qualification shall be one production model for each classification submitted for qualification.