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Guidance on Industry Standard for Gas Chromatographs

GIS 31-013

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GIS 31-014. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

Amoco (ACES)

A PC-PA-00-E	Process Control—Process Analysers—Engineering Specification
A PC-PA-00-G	Process Control—Process Analysers—Guide
A PC-PA-00-P	Process Control—Process Analysers—Supply Specification

ARCO (APCES)

Std 312-92	Analysers
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British Petroleum (RPSE)

RP 30-02	Instrumentation and Control, Selection and use of Measurement Instrumentation
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1. Scope

This GIS covers the design, manufacture, testing and shipping of a gas chromatograph system.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

American Petroleum Institute (API)

API RP 555 Process Analyzers

BP Engineering Technical Practices (ETP)

GIS 31-011 Guidance on Industry Standard for Analyser Houses
GIS 31-012 Guidance on Industry Standard for Analyser Sample Systems

Engineering Equipment & Materials Users Association

EEMUA 175 EEMUA Code of Practice for Calibration and Checking Process
 Analysers (Formerly IP Code 340)

International Electrotechnical Commission (IEC)

IEC 60079-10 Electrical apparatus for explosive gas atmospheres —
 Part 10: Classification of hazardous areas.

International Organization for Standardization (ISO)

ISO 2592 Determination of Flash and Fire Points - Cleveland Open Cup Method-
 (Use IP 36/02)
ISO 2719 Determination of flash point - Pensky-Martens closed cup method,
 (IP 34/02)
ISO 13736 Petroleum products and other liquids - Determination of flash point -
 Abel closed cup method, (IP 170/99)
ISO 3007 Petroleum products-Determination of vapour pressure-Reid method
 (IP69)
ISO 3015 Cloud Point of Petroleum product (IP 219)
ISO 3405 Determination of distillation characteristics at atmospheric pressure

National Fire Protection Association (NFPA)

NFPA 70 National Electric Code
NFPA 496 Standard for Purged and Pressurized Enclosures for Electrical Equipment

3. Scope of supply

The following items shall be within the scope of the analyser supplier:



- a. Gas chromatograph including interfaces for electrical, communication, gas samples and various utilities.
- b. Approval drawings prior to construction.
- c. Equipment manuals and final system drawings/documentation including a comprehensive spare parts list with part numbers, description and current pricing.
- d. Test data including test sheets, test chromatograms and statistical analysis for repeatability and drift.
- e. Packaging and transportation to site or contractor shop.
- f. Factory acceptance testing (FAT).

4. Basic design requirements

4.1. General design and materials

- a. Gas chromatograph(s) shall conform to the following standards as well as site codes in force:
 1. API 555 Process analyzers
 2. IEC 61831 On-line Analyzer Systems
 3. ISA S50.1 Compatibility of Analog Signals for Electronic Industrial Process Instruments
 4. NEMA ICS 6 Industrial Control Systems Enclosures
 5. NEMA 250 Enclosures for Electrical Equipment (1000 volts maximum)
 6. NFPA 70 National Electrical Code
 7. NFPA 496 Purged and Pressurized Enclosures for Electrical Equipment

Terminology used in this specification is defined in ISA S50.1.
- b. The gas chromatograph Supplier shall quote the necessary hardware and services to provide a completely assembled analyzer package suitable for installation inside of an analyzer shelter.
- c. The chromatograph system shall consist of the following:
 1. Sample Probes
 2. Sample Transport and Conditioning Systems
 3. Automated Stream Selection Manifold
 4. Chromatograph Analyzer/Programmer
 5. Maintenance Workstations and Printers (located in the control room)
 6. Recording Unit (located in the control room for generating chromatograms)
 7. Equipment required for serial communication with the plant DCS using Modbus RTU or other BP approved protocol.
- d. Supplier shall identify and quote any other equipment and services necessary to satisfy the gas chromatograph requirements for this project.
- e. The transmitted signal shall be as shown on the data sheet.
- f. In the event of a power source low voltage condition, below the minimum required for operation of any part of the gas chromatograph, the equipment shall perform an orderly shutdown without creating any random output or voltage ramps.



- g. Sample injection shall be inhibited until after the chromatograph oven reaches operating temperature.
- h. Gas chromatographs shall be able to operate within conditions stated on the data sheet.
- i. A data sheet shall be used to specify the anticipated stream composition and process conditions for each sample line to be analyzed.
- j. The Supplier shall be responsible for ensuring that the entire sample handling/conditioning system (probe, transport tubing, and sample system) will properly condition the process sample.

This responsibility is to ensure the analyzer receives a sample that can be properly and consistently analyzed.

- k. Supplier shall identify and quote all components required for the sampling systems, including the sample probes, and sample system, but excluding the transport tubing.
- l. The sample system(s) shall be completely assembled and tested.
- m. Loose components shall be identified and kept to a minimum.
- n. Sample system components shall be provided with an identification label stating function, range, and set point.
- o. Supplier shall furnish a comprehensive description of the equipment being quoted, including descriptive bulletins that pertain to the subject proposal equipment. Information considered essential is a descriptive drawing of the sample system proposed, having components identified with model numbers and material of construction, brochure of all major components being offered, time of analysis, description of any other special features being furnished, accuracy, reproducibility of analysis, and any exceptions to this specification.
- p. Accuracy of analysis and maximum percent drift over 24 hours shall be provided. The accuracy of the analyzer shall be in accordance with Subparagraphs 2.4.10 a and b and the analyzer data sheets.
- q. Supplier shall provide dimensional drawings showing internal layout of the gas chromatograph (including columns and detectors). Drawings shall also be provided for the sample valves detailing their principle of operation and construction.
- r. Supplier shall provide in the quotation a complete list of utilities required (for each analyzer), such as cooling water, instrument air, steam and electrical power. The list shall include quantities, flow rates, pressures, voltage and other defining parameters for the utilities to be supplied by the owner, including minimum quality and maximum pressure rating for all required utilities. Utilities shall be defined individually by the user (probe, transport tubing, sample system, analyzer, etc.).
- s. Supplier shall identify all consumables, such as calibration and carrier gases, and provide anticipated rates of consumption for the analyzer systems proposed.
- t. Electrical components, provided by the Supplier, shall be suitable for installation and operation in the electrical area classification specified on the Instrument Data Sheets. Analyzers shall be approved for use in the specified area classification to a standard that is recognized by the appropriate local authority. A label providing information on the approval shall be permanently fastened to the analyzer. 2.1.11 The Supplier shall quote all necessary interconnecting cables (installed) between analyzer components and related systems within the analyzer structure.
- u. Supplier shall recommend and quote any additional equipment required for the calibration, programming, and operation of the analyzer systems.
- v. Supplier shall respond in his proposal to each paragraph of this specification. Any exceptions taken shall be noted on a paragraph by paragraph basis.

