

MATERIAL AND EQUIPMENT STANDARD
FOR
PIG LAUNCHING AND RECEIVING TRAPS

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1. SCOPE

This Standard covers minimum technical requirements for design, manufacture, quality control, testing and finishing of pig launching and receiving traps which shall be installed in oil, gas and petrochemical industries in Iran under the service conditions stated in Clause 4 of this Standard Specification.

Pig launching and receiving traps for the pipeline size of 20 inches and larger shall be equipped with pig loading and unloading facilities such as crane or crane and rail system with all interconnecting piping between the crane system and closure operating units.

Only the general requirements of pig launching and receiving traps are given in this specification, the specific requirements of individual assemblies will be given in respective data sheets, relevant drawings and/or sketches.

This Standard shall be used for the preparation of requirements and purchase orders and subsequently as general requirements of the manufacturer.

Where cross references are made on this standard specification, the number of section or sub-section referred to is shown in bracket.

2. SOURCES AND REFERENCES

2.1 Sources

In preparation of this Standard, in addition to the referenced codes and standards mentioned in 2.2, the following standards and publications have also been considered:

NIGC	"Specification for Launcher and Receiver"
T.D. Williamson	"Drawing for Combined Launcher and Receiver"
T.D. Williamson	"Catalogue for Pigs and Pigging"

API (AMERICAN PETROLEUM INSTITUTE)

RP 500C	"Recommended Practice for Classification of Location for Electrical Installations at Pipeline Transportation Facilities"
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ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

B16.5 & MSS SP-44	"Pipe Flanges"
B16.9 & MSS SP-75	"Factory Made Wrought Steel Butt Welding & SP-43 Fittings"
B6.11	"Forged Steel Fitting, Socket Welding and Threaded"

BSI (BRITISH STANDARDS INSTITUTION)

BS 4232	"Specification for Surface Finish of Blast Cleaned Steel for Painting"
SIS-05-59099	"Blast Cleaning"
SSPC-SP-1	"Oil and Grease Removal by Solvent"

NFC (NATIONAL FIRE CODE)

NFC 70 & IEC 79-10 & BS 5395 Parts 1 & 2	"Classification of Hazardous Areas"
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NFC 30 Vol. 1	"Flammable and Combustible Liquid Codes"
NFC 497M	"Classification of Gases, Vapors and Dusts for electrical Equipment in Hazardous Classified Locations"

2.2 References

Throughout this Standard the following standards and codes are referred to. The editions of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard. The applicability of changes in Standards and codes that occur after the date of this Standard shall be mutually agreed upon by the Company and the Vendor:

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

Section VIII	"Rules for Construction of Pressure Vessels"
Section IX	"Qualification STD. for Welding and Brazing Procedures"
Section II	"Material Specification"

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

B31.8	"Gas Transmission & Distribution Systems"
B31.4	"Liquid Transportation Systems for Hydrocarbons"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIAL)

A193 Gr. B7	"Bolting"
A194 Gr. 2H	"For Nuts"

API (AMERICAN PETROLEUM INSTITUTE)

5L	"Specification for Line Pipe"
1104	"Welding of Pipelines and Related Facilities"

BSI (BRITISH STANDARD INSTITUTION)

BS 5500	"Specification for Unfired Fusion Welded Pressure Vessel-Saddles"
BS 1133	"Packaging Code"

IP (INSTITUTE OF PETROLEUM)

Part 15	"Model Code of Safe Practice Electrical Part 1"
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NACE (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)

MR-0175	"Determination of Sour Environment"
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IPS (IRANIAN PETROLEUM STANDARDS)

E-TP-100	"Engineering Standard for Painting"
C-TP-102	"Construction Standard for Painting"

3. UNITS

International system of units (SI) in accordance with IPS-E-GN-100 shall be used.

4. SERVICE CONDITIONS

4.1 Environmental Conditions

See Appendix B.

4.2 Electrical Supply

4.2.1 380 Volts 3 Phase, 4 Wires, 50 Hz.

4.2.2 Voltage variation: $\pm 10\%$.

4.2.3 Frequency variation: $\pm 5\%$.

4.3 Area Classification, Location and Installation of Equipment

The pig launching and receiving traps shall be installed outdoor without any weather protection.

4.3.1 Enclosures

The enclosures shall be Flameproof or explosion proof.

4.3.2 Location and type of control

The location and type of control shall be suitable for one or more of the requirements as indicated in Attachment 1.

5. BASIC DESIGN, CONSTRUCTION AND RATING

5.1 General

5.1.1 The following description is intended to indicate the general and minimum requirement of pig launching and receiving traps and does not relieve the supplier of his full responsibility for design, fabrication performance and safety of the equipment.

5.1.2 Trap assemblies shall be suitable for launching or receiving pigs for the purpose of gaging, cleaning and removing liquids from a pipeline which may contain water and/or liquid hydrocarbons and impurities such as sand and scale. Electronic and inspection pigs, batching corrosion inhibition service and special pigs may require different trap assemblies that should be checked with manufacturers before purchase or rental.

5.2 Body

The body shall consist of the following parts:

5.2.1 The spool piece of the same nominal size as the connecting pipeline, flanged or beveled end, as specified in requisition.

5.2.2 The barrel, its diameter being two nominal pipe size larger than the nominal size of the pipeline. The barrel shall have a sufficient length to accommodate three pipeline pigs. Multiple or special pigging operation should be checked with manufacturer.

5.2.3 Barrels for use in gas transmission system shall be designed in accordance with ANSI B 31.8 and those for use in liquid hydrocarbon transmission shall be in conformity with ANSI B 31.4.

5.2.4 End enclosures shall be of the quick opening type, suitable for operating by one man and vertically hinged to swing open in a horizontal plane. The design shall be incorporated with safety locking device such that the closure can not be opened when the assembly is under pressure.

The trap door should be equipped with a PDT (pig detector transmitter) micro switch, FX & WIP suitable for operating on 24 volt DC at 2 amperes rating. The end enclosures shall be in conformity with ASME Code Section VIII.

5.2.5 In order to prevent pigs to be stuck in drain and kicker connections, guide bars must be placed in these connections.

5.2.6 The trap assembly shall be furnished with adequate supports suitable for anchoring by bolts onto a concrete base and shall allow for some longitudinal movement of trap assembly when in service or subjected to direct sun shine to overcome linear thermal expansion due to the skin temperature. It may be necessary to design a directional anchor or slotted hole base when high skin temperature is involved. The frictional force should be reduced to minimum by appropriate means.

5.2.7 Barrel of launching and receiving traps shall be equipped with pressure gage.

5.2.8 Pig passage indicator required for receiving trap and main line shall be furnished by the supplier. Mechanism of operation and No. of passage indicator required shall be specified by client in the requisition when pig launching and receiving traps are ordered.

5.3 Design Criteria

5.3.1 The NACE Standard MR 0175 (1988 revision), clause 1.3, shall be followed to determine whether a sour environment exists, or could occur at some future date. Should the NACE Standard reveal existence of a sour environment, then the design criterion for sour service caused by the presence of hydrogen sulfide shall be considered.

5.3.2 Design for anchor, saddles, base plates, supports and other external load bearings shall comply with the requirements of either BS-5500 or AISE. The frictional force should be reduced to minimum by appropriate means.

5.3.3 The supplier's design calculation and drawings shall be approved by the purchaser prior to commencement of fabrication.

5.4 Materials

5.4.1 Materials shall be selected from the ASTM and API specifications and applicable sections of the codes and standards given in section 2 of this standard.

5.4.2 All materials shall be certified by test certificates stating the ladle analysis and results of physical tests performed. All materials used for the package shall be free from defects.

5.4.3 Where connections are made to external piping, the material and all other requirements for nozzles, flanges, bolts, gaskets and pipe shall be met as specified in that piping class.

5.4.4 The supplier may provide certain items of equipment and materials from other reputable manufacturers on his own responsibility for the quality and good performance in accordance with the terms and set standards and codes of this standard specification.

5.4.5 All wetted non metallic components of launching and receiving traps such as "O" ring of quick opening end closure shall be impervious to chemical attack by the fluid media.

5.5 Fabrication

5.5.1 Welding processes, welding procedures, welder qualifications, weld repairs, welding electrodes, thermal stress relief and heat treatment, etc. shall conform to ASME VIII Division 1 and ASME Section IX. Only welders and welding operators who are qualified in accordance with Section IX of ASME shall be employed in production.

5.5.2 Weld repairs if required, shall not be permitted after heat treatment without approval by the purchaser. Repaired welds shall be heat treated to the codes stated above.

5.6 Inspection and Testing

5.6.1 All pressure welds shall be 100% radiographed.

5.6.2 The trap assembly shall be hydrostatically tested to 1.5 times the design pressure.

5.6.3 The test pressure shall be maintained for a minimum of 2 hours with test procedure described in sub clause 7.2.1.

5.6.4 Chemical analysis and mechanical and impact tests are required for the barrel, reducer and neck pipe (when furnished) for each trap in accordance with the design codes. These items shall be tested ultrasonically to the satisfaction of purchaser in accordance with Appendix 12 of ASME code Sec.VIII Div.1.

5.7 Surface Preparation

After acceptance of hydrostatic test, all external surfaces shall be prepared and prime coated in accordance with IPS-C-TP-102 and IPS-E-TP-100. The suppliers' proposed method of surface preparation shall be approved by the purchaser.

5.8 Pipeline Pig Passage Detector

5.8.1 The indicator shall withstand all specified weather and climatic conditions and be of robust construction.

5.8.2 With the exception of mild steel mounting base, all metal parts shall be corrosion resistance material.

- 5.8.3 Unless specified otherwise signal device shall be removable without leakage or line shutdown.
- 5.8.4 Detector assembly shall be suitable for pressure and temperature ratings specified and appropriate test certificate shall be provided.
- 5.8.5 Detectors required for mounting on main pipe line shall be set on a steel base suitably beveled for welding direct onto the line pipe specified.
- 5.8.6 The indicator shall be bidirectional and function equally well in either direction.
- 5.8.7 The trigger mechanism shall detect undersized pigs and the mechanism shall be maintenance free.
- 5.8.8 Detector assembly shall be suitable for visual and/or electrical signaling.
- 5.8.9 Visual signals shall be clearly visible from a distance of 50 meters and should be manually resettable.

5.9 Electrical Signals

- 5.9.1 Type: Micro switch, PDT.
- 5.9.2 Rating: 24 V-DC, 2 Amps.
- 5.9.3 Load: Relay (inductive).
- 5.9.4 Housing: Weather Proof/Dust Proof/Explosion proof suitable for use in accordance with Institute of Petroleum Division 1 Group II, Gases and Vapors.
- 5.9.5 Cable entry: ET with compression gland for PVC/LC/SWA/PVC cable.
- 5.9.6 Mounting: Above ground non extended.
- 5.9.7 Pressure Rating: The same as pig trap rating.
- 5.9.8 Kind: Uni-directional.
- 5.9.9 Elec./Signal: Auto reset

5.10 Nameplates and Labelling

- 5.10.1 Each pig launching and receiving trap shall be labelled with engraved stainless or non corrosive alloy nameplates together with non corrosive fixing materials, showing all data as called for in this standard including but not limited to, the followings;
 - a) Purchaser's name and order No.
 - b) The year of manufacture.
 - c) Manufacturer's name or trade mark.
 - d) Type of materials, size, serial number and designation making it possible to obtain relevant information from the manufacturer.
 - e) Flange pressure rating.
 - f) Design and test pressure.
 - g) Dimensions and physical properties including weight.
 - h) Tag number.

i) Design temperature.

5.10.2 The nameplate shall be legible and easily visible when fixed to non-removable part of the frame.

5.10.3 The nameplate shall be corrosion and moisture resistant and provided with indelible inscriptions.

5.11 Tools and Testing Equipment

Special tools and equipment if required for erection, commissioning, maintenance and testing shall be shipped together with the assembly including sufficient washers, "O" rings, seals, lubricants and others.

5.12 Provision for Handling and Erection Equipment

Each unit shall be provided with hoisting facilities, bolts foundation clamps and small materials required for erection on site shall be packed inside the transport unit.

6. INSPECTION DURING MANUFACTURING

The purchaser or his nominee shall have free access to the manufacturing plant engaged in the construction of the equipment to carry out the necessary inspections at any stage of construction. The supplier shall place at the disposal of purchaser, free of charge, such instruments as are required at the inspection point to enable the purchaser carry out his inspection of equipment efficiently in this respect. Such inspections in no way relieve the supplier of his responsibilities under the terms of this standard specification and or other applicable relevant documents.

7. TESTS AND CERTIFICATES

7.1 The specific requirements for test is described in section 5.6 of this standard.

7.2 The general requirement for test is described but not limited to the followings:

7.2.1 The test procedure as proposed by the supplier should be agreed and approved by the purchaser before tests are carried out.

7.2.2 Purchaser may require witnessed tests to be carried out in the presence of its nominated representative who should be informed at least 4 weeks in advance of the date of conducting the tests and confirmed 10 days before the test.

7.2.3 All the test equipment, labor, consumables and other expenses shall be provided by the supplier at no extra cost to the purchaser.

7.2.4 Test certificates should refer the serial number of the equipment tested and must bear the purchaser's name and manufacturer's name and seal; the certificate should be approved by the purchaser before shipment instructions are given.

7.2.5 The certificate shall specify material, post weld heat treatment, radiography, ultrasonic examination as well as design code.

8. FINISH

8.1 All unpainted surfaces, e.g. flange surfaces, shall be properly protected against corrosion with anti-rust compound, easily removable by hydrocarbon solvents.

8.2 The pig launching and receiving trap shall be cleaned and shall be painted with two layers of anti-rust undercoat. A final layer of paint suitable for the specified environment shall be applied on the purchaser request.

8.3 The color of final layer shall be as specified in requisition.

8.4 All unpainted surfaces (internal and external) shall have a coat of moisture and fungus resistance varnish.

9. INFORMATION FOR MANUFACTURER/SUPPLIER

Further to the information included in other parts of this specification, pig launching and receiving drawings together with relevant data sheets shall be completed and furnished with the requisition as a part of Appendices of this standard specification.

10. DOCUMENTATION LITERATURE TO BE SUBMITTED BY MANUFACTURER/SUPPLIER

10.1 At the quotation stage the supplier shall submit 4 sets of the following documents.

- a) Report of experience background, major clients and annual sale for the similar equipment.
- b) Reference list showing the successful operation of similar equipment for at least two years, and the locations of equipment for at least two years, and the locations of equipment offered in major oil industries.
- c) Typical type test certificate of similar equipment.
- d) Declaration of confirmation with the set standards, and or clear indication of deviations from the standards and specification.
- e) Spare parts and special tools requirements.
- f) List of recommended commissioning spare parts with the price.
- g) List of recommended spare parts for three years of operation.
- h) List of special tools, testing devices and instruments.
- i) Shipping dimensions (length, width and height) and weight, with shipping schedule.

Note:

The quotation will be rejected as incomplete if the above mentioned required information are not included.

10.2 At ordering stage the supplier shall submit 5 sets of the following documents.

- a) Outline drawings floor plan, elevation and end view, giving complete sizes and dimensions, various connections to outside equipment and recommended installation details for purchaser's approval.
- b) Design calculations and proposed test procedure for purchaser's approval.
- c) Reproduces (1 set only) of above mentioned drawings after approval duly certified by the supplier.
- d) Prints of certified drawings as well as agreed and approved test procedure.
- e) The purchaser's comments or approval shall be given within 21 days of the receipt of the relevant documents.

10.3 Before shipment of equipment the supplier shall submit 15 sets of the following documents, according to the following time table, to be received by the company.

- a) Codes and standards compliance certificates, 8 weeks min.
- b) Installation, operation and maintenance manuals, four weeks min.
- c) Final factory test certificates, including test data and calculated results, three weeks min.
- d) Inspection certificate issued by the purchaser nominated inspector, two weeks min.
- e) Final revision of illustrated and numbered part list and 3 year running spare parts list, two weeks min.

Note:

All technical documentation and design engineering documentation submitted to purchaser shall be considered the property of the purchaser and supplier shall have no claims thereto after their submission.

11. REJECT CLAUSE

The equipment may be rejected if measurements and inspection reveal any discrepancies between quoted figures resulting in requisition and those measured actually.

12. PACKING AND SHIPMENT

The equipment shall be suitably packed and protected against all damages or defects which may occur during handling, sea shipment to the port and rough road haulage to site and extended tropical open air storage. All items shall properly be packed to comply with the requirements of BS-1133.

13. GUARANTEES AND WARRANTIES

The supplier shall guarantee his equipment during commissioning and for one year operation starting from the date of completion of commissioning against the following defects:

- a) All operational defects.
- b) All material defects.
- c) All fabrication and design defects.
- d) All defective parts shall be replaced by the supplier in the shortest possible time, free of charge, inclusive of dismantling, reassembly at site and all transportation costs.

The supplier shall guarantee the provision of spare parts to the purchaser for a minimum period of 8 years from the date of dispatch. In the event the supplier can not supply the required spares (whether of his own manufacturer or other's) within the period of time, the costs of complete replacement units will be borne by the supplier.

14. SPARE PARTS

All spare parts shall comply with the same standards, specifications and tests of the original equipment and shall be fully interchangeable with the original parts without any modifications at the site. They shall be correctly marked in accordance with the spare parts lists and interchangeability record and be prescribed to prevent deterioration during shipment and storage in humid tropical climate.

15. LANGUAGE

All correspondence, literature, drawings, etc., shall be in English. Documents in other languages shall not be considered unless legally translated to English.

APPENDICES

**APPENDIX A
MAJOR PHYSICAL PROPERTIES**

FLOWING CONTENTS			
SPECIFIC GRAVITY AT 15°C AT 4°C			
COEFFICIENT OF EXPANSION (M/ °C)			
VISCOSITY (ES) AT 15°C AT 4°C			
POUR POINT (°C) WINTER SUMMER			
Min. FLASH POINT (°C)			

Note:

Further to above mentioned information the following properties shall be included:

- 1) Design pressure.
- 2) Design temperature.
- 3) Chemical composition of flowing content.

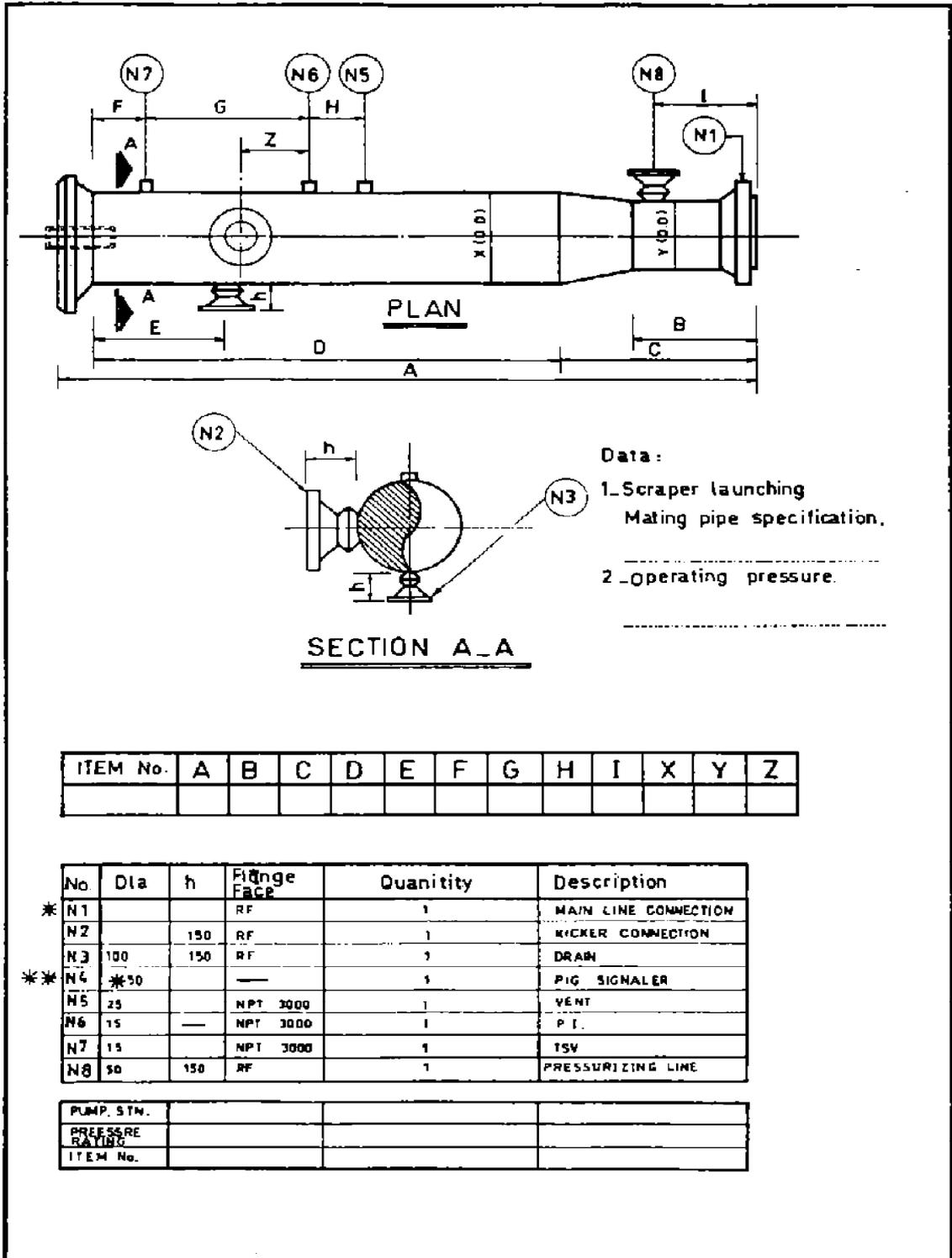
**APPENDIX B
AMBIENT CONDITIONS**

Maximum sun temperature (for calculating the maximum temperature rise of the equipment)

Minimum ambient temperature

Maximum recorded velocity of prevailing wind

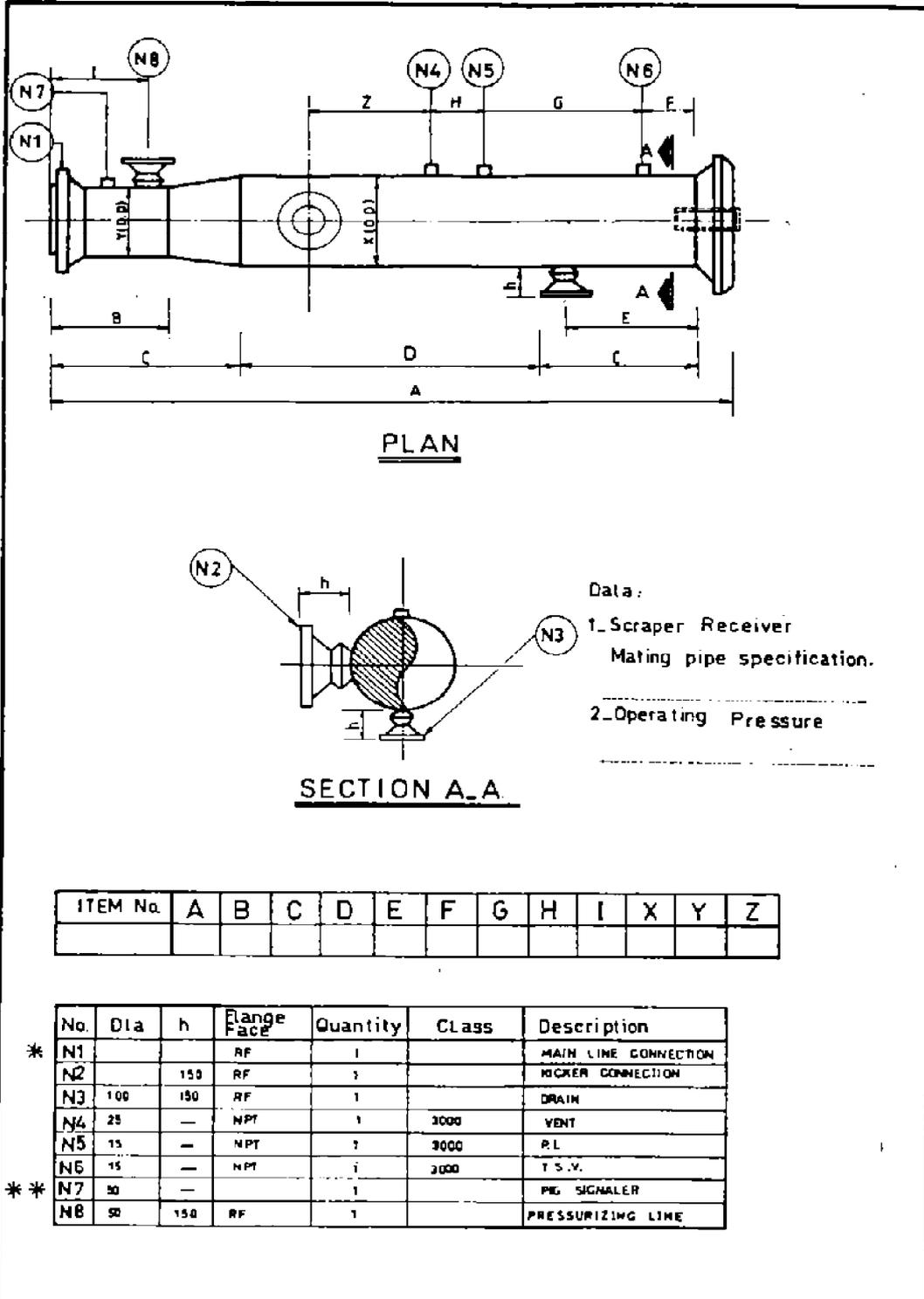
APPENDIX C
PIG LAUNCHING TRAP



* IF BEVELED END SPOOL PIECE IS REQUIRED SHALL BE SPECIFIED.

** WILL BE INSTALLED ON MAIN LINE. SCRAPER LAUNCHING

APPENDIX D
PIG RECEIVING TRAP



* IF BEVELED END SPOOL PIECE IS REQUIRED SHALL BE SPECIFIED.

** WILL BE INSTALLED ON MAIN LINE. SCRAPER RECEIVING

**ATTACHMENT
LOCATION AND TYPE OF CONTROL**

Local (manual)	- with controls on or near controlled equipment.
Panel (manual)	- with controls on Station Control Panel.
Panel (automatic)	- with controls on Station Control Panel.
Dispatch (automatic)	- with controls in Dispatching Center.