



Pipeline Engineering & Supply Co' Ltd. Standard Pig Launcher / Receivers.

The information below derives the basis for basic form standard Pig Launcher/Receiver design, manufacture and testing within Pipeline Engineering. This basic standard shall be followed in the absence of any client stipulated project specification.

1. Reference Specifications.

Design Codes	ASME VIII Div 1 ASME B31.3 ASME B31.4 ASME B31.8 PD5500
Material Codes	API 5L ASTM BS EN MSS-SP-75 ASME B16.5 ASME B16.47 ASME B16.9 NACE MR0175
Fabrication	ASME V ASME VIII ASME IX PD5500

2. Design Code.

Liquid Service	ASME B31.4	(Design Factor 0.6)
Gas Service	ASME B31.8	(Design Factor 0.5)

3. Materials

The following materials are PE standard selection and may be modified by the client or project specification.

ASME Class 150 & 300 Launcher/Receivers.

Normal Service
End Closure: ASTM A105N
Major/Minor Barrels: ASTM A106 Gr.B/API 5L Gr.B
Reducer/Fittings: ASTM A234 WPB
Flanges: ASTM A105N
Support Plating: ASTM A516 Gr.70 / BS EN 10025 S275

Low Temperature Service (Impact Test Requirements)
End Closure: ASTM A350 LF2
Major/Minor Barrels: ASTM A333 Gr.6
Reducer/Fittings: ASTM A420 WPL6
Flanges: ASTM A350 LF2
Support Plating: ASTM A516 Gr.70 / BS EN 10025 S275



ASME Class 600 & 900 Launcher/Receivers.

Normal Service

End Closure: ASTM A694 F52

Major/Minor Barrels: API 5L X52

Reducer/Fittings: MSS-SP-75 WPHY52

Flanges: ASTM A694 F52

Support Plating: ASTM A516 Gr.70 / BS EN 10025 S355

Low Temperature Service (Impact Test Requirements)

End Closure: ASTM A350 LF2/ASTM A694 F52

Major/Minor Barrels: ASTM A333 Gr.6/API 5L X52

Reducer/Fittings: ASTM A420 WPL6/PSS-SP-75 WPHY52

Flanges: ASTM A350 LF2/ASTM A694 F52

Support Plating: ASTM A516 Gr.70 / BS EN 10025 S355

ASME Class 1500 & 2500 Launcher/Receivers.

Normal Service

End Closure: ASTM A694 F52/F60/F65

Major/Minor Barrels: API 5L X52/X60/X65

Reducer/Fittings: MSS-SP-75 WPHY52/WPHHY60/WPHY65

Flanges: ASTM A694 F52/F60/F65

Support Plating: ASTM A516 Gr.70 / BS EN 10025 S355

Low Temperature Service (Impact Test Requirements)

End Closure: ASTM A350 LF2/ASTM A694 F52/F60/F65

Major/Minor Barrels: ASTM A333 Gr.6/API 5L X52/X60/X65

Reducer/Fittings: ASTM A420 WPL6/PSS-SP-75 WPHY52/HY60/HY65

Flanges: ASTM A350 LF2/ASTM A694 F52/F60/F65

Support Plating: ASTM A516 Gr.70 / BS EN 10025 S355

Plate Material Alternatives

At any time as required by size, non availability of API / ASTM pipe, Major/Minor Barrel and forged Reducer/Fitting materials maybe replaced with equivalent carbon steel plate materials as follows:-

ASTM A106 Gr.B / ASTM A234 WPB

Plate Equivalent ASTM A516 Gr.70

API 5L X52 / MSS-SP-75 WPHY52

Plate Equivalent BS EN S355 / P355 NL1

API 5L X60/X65 & WPHY60/65

Plate Equivalent BS7191 450EM / P460 NL1

Material Certification.

As a minimum all pressure retaining / wetted components shall be supplied with 3.1.B mill certificates.

Sour Service.

Materials in Sour Service shall meet the requirements of NACE MR0175. Material Hardness shall be restricted to 248HV10 max.

Hydrogen Induced Cracking HIC test as per NACE TM0284/TM0177 for plate and pipe material shall be optional with client to confirm requirement.



4. Components

i. End Closures

Shall be of proven safe design, using Design Code ASME VIII Div 1 – UG35b.

Acceptable Manufacturers are:-

Pipeline Engineering ROC Type

GD Engineering Bandlock Type

Scholz Bayonet Type,

All end closures shall provide full bore access to the major barrel and shall have pressure safety/warning device to prevent opening under internal pressure.

Threaded Type and Yoke type shall no longer be used.

End Closure seal material shall be selected to be suitable for the service it which it is intended, and shall not be subject to low pressure leakage. Pipeline Engineering Standard Seal Material is VITON V95X which is explosive decompression resistant as standard.

ii. Barrels

Shall be sized for the longest pig that will be used + a margin of 10%. Longest Pigs are usually intelligent types a table is provided below indicating typical barrel lengths.

Major Barrel :- The enlarged section used for loading/receiving of Pigs - shall be at least two pipe sizes greater in diameter than the minor barrel above 10” NS. Below 10”NS one pipe diameter greater can be accepted.

Major Barrel length shall be a minimum of 2 conventional pig lengths + 10% or the length of the longest Intelligent Inspection Pig + 10%.

Reducer:- A Reducing section to join major and minor barrels. Reducer Type should be Eccentric for Horizontal Launcher/Receivers, Concentric for Vertical Launcher/Receivers. Concentric Reducers may be used for horizontal Receivers when fitted with a pig removal tray.

Minor Barrel:- A barrel section equal in diameter to the pipeline. Minor barrel length if using only conventional pigs should be equal to 1 pig length + 10%. Refer to table below for barrel length for Intelligent pig tools. The internal diameter of the minor barrel should be the same as the main pipeline. Any transitions created by wall thickness variations should be tapered at a max’ angle of 14 deg to allow for the smooth transition of the pig.

Table of Typical Recommendations for Barrel and Essential Nozzle Diameters.

Pipeline Diameter (Inches NS)	Major Barrel Diameter (Inches NS)	Bypass Line (Receiver) (Inches NS) *	Kicker Nozzle (Launcher) (Inches NS)	Balance Line (Inches NS)	Drain Nozzle (Inches NS)
4	6	3	2	2	2
6	8	4	2	2	2
8	10	4 or 6	4	2	2
10	14	6	4	2	2
12	16	6 or 8	4	2	2
14	18	6 or 8	4	4	4
16	20	8	6	4	4
18	22	8 or 10	8	4	4
20	24	10	8	4	4
24	28	12 or 16	8	4	4
28	32	16 to 20	10	4	4
30	34	16 to 24	10	4	4
32	36	16 to 24	10	4	4



Pipeline Engineering & Supply Co. Ltd. Standard Pig Launcher / Receivers

36	40	18 to 24	12	4	4
38	42	20 to 28	12	4	4
40	44	20 to 32	12	4	4
42	46	20 to 36	16	4	4
48	52	24 to 36	18	4	4
56	60	32 to 40	20	4	4

- Note – Bypass Diameter maybe revised by client if process requirements dictate.
- Note – For Horizontal Receivers/Launchers barrels may be sloped at 1:100 to aid drainage. Universal Bi-Directional units used for both Launching and Receiving should be level. Launchers / Receivers used for automated multi launch / receive of Spheres should be inclined/ declined at a minimum angle of 3 deg and maximum angle of 5 deg.

Recommendations for Launcher/Receiver Barrel Lengths for Intelligent Pigs

Pipeline Diameter (Inches NS)	Aprox' Length Intelligent Inspection Pig (Metres)	Approx' Min' Barrel Lengths (See Notes)			
		Launcher		Receiver	
		Major Barrel (m)	Minor Barrel (m)	Major Barrel (m)	Minor Barrel (m)
4	2.8	3.0	0.5	3.0	3.0
6	2.8	3.0	1.5	3.0	3.0
8	3.9	4.1	1.5	4.1	4.1
10	4.3	4.5	1.5	4.5	4.5
12	4.3	4.5	1.5	4.5	4.5
14	4.8	5.0	1.5	5.0	5.0
16	5.1	5.5	1.5	5.5	5.5
18	5.1	5.5	1.5	5.5	5.5
20	5.1	5.5	1.5	5.5	5.5
24	5.7	6.0	1.5	6.0	6.0
28	5.8	6.0	1.5	6.0	6.0
30	6.0	6.0	1.5	6.0	6.0
32	6.6	6.6	1.5	6.0	6.6
36	6.6	6.6	1.5	5.5	6.6
38	6.6	6.6	1.5	5.5	6.6
40	6.6	6.6	1.5	5.5	6.6
42	6.6	6.6	1.5	6.5	6.6
48	6.6	6.6	1.5	6.6	6.6
56	6.6	6.6	1.5	6.6	6.6

Note. Refer to Intelligent Pig Manufacturers latest data sheets – prior to final fixing of barrel lengths.

iii. Lines / Nozzles.

Bypass – to connect the pipeline to the related facilities beyond the Launcher or Receiver.

Kicker – connection from the major barrel to bypass line to divert fluid or gas through the Launcher or Receiver to launch or receive a pig. For Launcher locate as near too the end closure as possible, for a Receiver locate as near to the Reducer as possible. (For Bi-Directional pig traps a single kicker line could be located approximately half way along the major barrel or twin kicker line could be provided).

Vent:- to vent pressure from the Launcher or Receiver prior to accessing to insert of retrieve pig. Locate at highest point. Minimum Nozzle Diameter for Vent shall be 2” NS.

Drain:- to drain/vent pressure / fluid from the Launcher or Receiver prior to accessing to insert of remove a pig. Locate a lowest point, one or more drain nozzles may be used.



Pipeline Engineering & Supply Co. Ltd. Standard Pig Launcher / Receivers

Others:-

Balance:- A line between major and minor barrel to allow filling and pressurisation of a Launcher in front and behind the pig at the same time. This prevents a pig moving forward into a closed isolation valve or backwards thus losing its seal in the reducer and being unable to launch. A balance may also be fitted to a Receiver to prevent any differential pressure being retained behind a received pig.

Relief:- to vent overpressure. Size to suit process flow conditions. Refer to Relief Valve manufacturer.

Purge:- Optional for vessels in very corrosive / toxic service and to enable a nitrogen purge prior to entry to insert or remove pig.

Instrument: - for Pressure Gauge / Transmitter / Pig Signaller Device. Min' NS 2". Pressure Gauge connection to be placed as near to End Closure as possible.

Nozzles on Launcher / Receivers maybe formed from the following options:-

- a. Equal or Reducing Tee & Weld Neck Flange – consider where the nozzle/line size is equal to or more than 50% of the major/minor barrel diameter NS.

(Note: Nozzles with diameter greater than 50% of barrel diameter should be barred to prevent a pig or debris being drawn into/trough the nozzle).

- b. Self Reinforcing Weldolet Fitting & Weld Neck Flange
- c. Self Reinforcing Long Weld Neck Flange.
- d. Sweep Branch Insert Fitting & Weld Neck Flange.
- e. Pipe Nozzle & Weld Neck Flange (+ reinforcement pad if required)

Nozzle thickness and reinforcement shall be calculated and proven in accordance with ASME B31.4 / B31.8 as applicable.

Orientations:-

Kicker – locate on side of alternatively top of Launcher/Receiver.

Drains – locate on bottom of Launcher/Receiver.

Balance – locate usually to side of Launcher/Receiver

Others – locate to top of Launcher/Receiver.

Additional Components.

All Pig Launcher / Receivers shall be provided with:-

One Pig Signaller Device – via 2" flange or butt weld nozzle on minor barrel.

A minimum of two Support legs – designed to support and restrain the vessel and carry the full weight plus the weight of the process medium and pigs. Supports shall be of sliding type as standard. The effect of any wind / seismic / blast / transport loads on the support structure should be addressed.

A minimum of two number Lifting Padeyes.

A minimum of two number Earthing Points.



A Nameplate in 316 Stainless Steel and listing as a minimum:-

Manufacturers Name.
Vessel Description, Size and Type.
Design Code.
Design Pressure.
Design Temperature.
Hydrotest Pressure.
Data of Manufacture.
Weight.
Volume.
NDT / Heat Treatment Data.

Optional – For Multi and/or Automated Sphere Launching & Receiving.

- a. Sphere Release Fingers – install via 4” NS Flange or Butt Weld Nozzle for Sphere diameters upto 24” NS.
- b. Sphere Flap Mechanisms – install via 12”/14” Flanged Nozzle for Sphere Diameters above 28”

For Sphere Launch Control locate 2 x Sphere Finger/Flap nozzles one Sphere diameter apart on the top of the vessel major barrel. Locate the leading nozzle as close to the Reducer section as possible. Major barrel length to be sized for a minimum capacity of 5 pipeline spheres.

For Sphere Receive locate 2 x Sphere Finger/Flap nozzles one Sphere diameter apart on the top of the vessel major barrel. Locate the leading nozzle as close to the End Closure section as possible. Major barrel length to be sized for a minimum capacity of 5 pipeline spheres. In a Pig Receiver Sphere Fingers/Flaps are used to control and make safe the unloading of spheres.

Refer to Sphere Finger/Flap Product Data for further information.

5. Manufacture

Shall be in accordance with ASME VIII Div 1, B31.4, B31.8 as applicable.
Welding shall be in accordance with ASME IX.

6. Non Destructive Testing.

All Launcher/Receivers shall be subject as a minimum to:-

- 100% Radiography (Gamma) of all pressure retaining butt welds. Should Radiography not be practical 100% UT examination shall be substituted.
- 100% MPI examination of pressure retaining butt welds, set on nozzle welds, attachment welds and support structure welds.
- 100% UT examination to set in nozzle welds.

Hydrotest: At a pressure of 1.5 x the design pressure for a minimum duration of 1 Hour.
Should stress level at 1.5 times design pressure be greater than 90% of SMYS, the hydrotest pressure will be reduced to level so as not to exceed 90% of SMYS.



7. Painting.

Launcher / Receiver standard paint specification is as follows:-

Blast Clean	To Std Sa2.5	Min' DFT 75 microns
Primer Coat	Inorganic Zinc Rich	Min' DFT 125 microns
Intermediate Coat	High Build Epoxy	Min' DFT 50 microns
Top Coat	Polyurethane Epoxy	Total Min' DFT 250 microns
		Standard Colour: Light Grey.

8. Documentation.

Each Pig Launcher/Receiver Package will be provided with a full Manufacturing Data Dossier.

The Dossier will include as a minimum:-

As Built Design Drawings & Calculations.

Material Traceability Sheet & Material Mill Certification 31B (3.1)

Weld Procedures and Qualification Records

Non Destructive Test Reports & Weld Location Map

Heat Treatment Reports

Paint Reports

Inspection certificates.



9. Pig Trap System Valves General Guideline

Normally a trap system will include following valves as a minimum:

- 1 Pig Trap Valve (Full Bore) *
- 1 Bypass Valve
- 1 Kicker Valve *
- 1 balance Valve (for launchers)
- 1 Drain Valve *
- 1 Vent Valve *

* Note: On Offshore installations double valve isolation system is considered as common engineering practice.

The type of valves is generally described on each operator and/or project specification, being normally ball & gate valves.

Pig Trap Valve will be full bore, generally double block & bleed, API 6D design ball valve, with a minimum internal diameter consistent with the pipeline one. Through conduit gate valves would be also acceptable.

Bypass & Kicker Valve will be generally ball valve type, double block & bleed, API 6D design.

Drain valve will be generally ball valve type. (On double isolation systems, i.e. offshore applications, combination of ball valve + gate valve is a standard practice).

Vent valve will be ball or gate valve type.

Valves should have weld ends rather than flanges if the elimination of potential leaks is more important than periodical maintenance and easier replaceability (i.e. for toxic services service).

PIPELINE ENGINEERING & SUPPLY COMPANY LIMITED

Gatherley Road, Catterick Bridge, Richmond
North Yorkshire, DL10 7JQ, England
Tel +44 1748 813 000 // Fax +44 1748 813 501
sales@pipelineengineering.com // technical@pipelineengineering.com
<http://www.pipelineengineering.com>

An ASME 'U' & 'U2' Authorized Company

Holder of ISO 9001 & 14001 Certification

Holder of EC Certificate of conformity. According PED 97/23/EC

Member of the international Pipeline Pigging Association (PPSA)