



Offshore Design Section  
Engineering Services  
ISO – 9001:2008

FUNCTIONAL  
SPECIFICATION  
FOR  
SHUTDOWN PANEL

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# FUNCTIONAL SPECIFICATION FOR SHUT DOWN PANEL

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<p>1.0 SCOPE OF THIS DOCUMENT:</p> <p>1.1 This specification describes the essential considerations in the selection, design, procurement, engineering, installation, calibration, testing and commissioning of Shut Down Panel (SDP).</p> <p>1.2 The Contractor shall be responsible for the design, engineering, procurement, packing, calibration, testing at yard and offshore, shipment to yard and offshore site, installation and commissioning at site of the Shut Down Panel (SDP).</p> <p>1.3 The Contractor shall be responsible for the technical integrity of the Shut Down Panel offered, including design, materials, manufacture, assembly, testing, performance and specified engineering services. All activities shall be in accordance with the scope of supply, functional specification, data sheets and interface information supplied by the Company.</p> <p>2.0 STANDARDS &amp; SPECIFICATIONS:</p> <p>2.1 Reference Specifications:</p> <p>a) Specification No. 3.6: Instrumentation Design Criteria</p> <p>b) Basic Bid Work</p> <p>3.0 SCOPE OF SUPPLY:</p> <p>3.1 The scope of work shall include a Shut Down Panel (SDP) complete with SSV control (pneumatic / hydraulic), SSSV control (hydraulic), ESD functions, FSD functions, Well start-up system, Tele-metering functions and other components and / or functionality as described in this document and in the scope of work. The number of Well Control Modules required in the SDP, the type of SSV system i.e., pneumatic or hydraulic, etc shall be as indicated in the Scope of Work.</p> <p>3.2 The scope of supply shall also include commissioning spares and Mandatory Spares as a part of the equipment as suggested by the Manufacturer &amp; list of one years’ operational spares along with other type of spares as indicated in clause 3.6.4.8 of Instrumentation Design Criteria.</p>				
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<div>4.0 SHUT DOWN PANEL:</div> <div>4.1 <u>Purpose / Application:</u><div>4.1.1 The purpose of the Shut Down Panel on offshore platforms is to control all safety shutdown functions of the platform, and thereby ensure safety of personnel and equipment.</div></div> <div>4.2 <u>General:</u><div>4.2.1 The Shut Down Panel shall perform platform safety functions such as shut-in of Surface Safety Valve (SSV), shut-in of Sub-Surface Safety Valve (SSSV), Emergency Shut Down (ESD) functions, Fire Shut Down (FSD) functions, well start-up functions, etc. as described in the following document and in the basic bid work.</div><div>4.2.2 The SSV, ESD, FSD and well start-up systems shall in general be pneumatic and the SSSV system shall in general be hydraulic. The functional requirements and system requirements of these sub-systems shall be as given below in clause 4.3 and 4.4 respectively.</div><div>4.2.3 Pneumatic Supply:<div>4.2.3.1 Pneumatic supply to the panel shall in general be as per clause 3.6.4.2.1 of Instrumentation Design Criteria.</div></div><div>4.2.4 Hydraulic Supply:<div>4.2.4.1 The hydraulic supply shall be as follows:<table><tr><td>Hydraulic circuit design pressure:</td><td>350 Kg/cm<sup>2</sup></td></tr><tr><td>SSSV / SSV Actuator swept volume:</td><td>70 ml.</td></tr><tr><td>Approximate distance of SSSV header:</td><td>200 m</td></tr></table></div></div></div> <div>4.3 <u>Functional Requirements:</u><div>4.3.1 The Shut Down Panel shall initiate shut-in of all Surface Safety Valves (SSV) under any of the following conditions:<div><div>a) When any one of the points shown in the platform SAFE Chart / P&amp;ID for SSV shut-in receives an abnormal signal i.e. loss of holding signal.</div><div>b) When the associated wellhead pressure gives an abnormal signal i.e. loss of holding signal.</div></div></div></div>				Hydraulic circuit design pressure:	350 Kg/cm <sup>2</sup>	SSSV / SSV Actuator swept volume:	70 ml.	Approximate distance of SSSV header:	200 m
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<p>c) When the Common manual reset / shut-in button provided on the panel for each SSV is activated.</p> <p>The SSV control system shall be either pneumatic or hydraulic as indicated in the Scope of Work. The control system required for performing this function shall be as per clause 4.4.1 of this document.</p> <p>4.3.2 The Shut Down Panel shall initiate shut-in of all Sub-Surface Safety Valves (SSSV) under the following conditions:</p> <p>a) After respective Surface Safety Valves have shut-in and / or when any one of the points shown in the SAFE table / P&amp;ID for SSSV shut-in receives an abnormal signal. A timing circuit shall be utilized to provide a time delay of 3 minutes (which is adjustable) between SSV shut-in and SSSV shut-in. The time circuit shall be of pneumatic type only.</p> <p>b) When the Common manual reset / shut-in button provided on the panel for each SSSV is activated.</p> <p>The control system required for performing this function shall be as per clause 4.4.2 of this document.</p> <p>4.3.3 The Shut Down Panel shall initiate platform ESD and / or FSD as per the platform SAFE charts. The system requirements for performing ESD and FSD functions shall be as per clause 4.4.3 of this document.</p> <p>4.3.4 The Shut Down Panel shall use the following control signals for the different shut down circuits:</p> <table><tr><td>General Shut Down Circuit:</td><td>0 or 3.5 Kg/cm<sup>2</sup> (Pneumatic)</td></tr><tr><td>SSV Shut Down Circuit:</td><td>0 or 7.0 Kg/cm<sup>2</sup> (Pneumatic) or 105 to 210 Kg/cm<sup>2</sup> (Hydraulic)</td></tr><tr><td>SSSV Shut Down Circuit:</td><td>200 to 300 Kg/cm<sup>2</sup> (Hydraulic)</td></tr></table> <p>The well shut in pressure shall be as per process design criteria.</p> <p>4.3.5 The Shut Down Panel shall be capable of telemetry and tele control of all parameters shown in the platform SAFE Charts and P &amp; IDs. The shutdown system shall be capable of operation even when the telemetry system is not installed or communication failure takes place. The system requirements for achieving this function shall be as per clause 4.4.4 of this document.</p> <p>4.3.6 The SDP shall be capable of initiating remote opening of individual SSVs. Remote opening of individual surface safety valves (SSV) shall be achieved only after initial</p>				General Shut Down Circuit:	0 or 3.5 Kg/cm <sup>2</sup> (Pneumatic)	SSV Shut Down Circuit:	0 or 7.0 Kg/cm <sup>2</sup> (Pneumatic) or 105 to 210 Kg/cm <sup>2</sup> (Hydraulic)	SSSV Shut Down Circuit:	200 to 300 Kg/cm <sup>2</sup> (Hydraulic)
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<p>start-up and commissioning and shall be effective only when all the conditions specified in the platform Safe Table /P&amp;ID are in healthy state. The opening of surface safety valves (SSV) and any other valve through Telecontrol shall be accompanied by automatic starting of an audible alarm with different tone. This audible alarm shall sound for maximum time of three (3) minutes unless reset earlier. Visual indication for the same shall be provided at the panel front on well control modules.</p> <p>4.3.7 The SDP shall have a Well Start-up system for manual opening of individual wells since pneumatic supply is generally not available on the platforms for initial start-up of the wells. These operations shall be accomplished by operating hydraulic pumps manually.</p> <p>4.3.8 The logics in the SDP shall take care that after tripping, the system is not be brought back to normal, unless, “RESET” is actuated and tripping conditions have come back to normal.</p> <p>4.3.9 In case of shutdown, the air supply to the hydraulic pumps shall be cut off until shutdown signal is normalized and the ESD is reset manually. Vendor shall ensure the same in the logic.</p> <p>4.3.10 It is the responsibility of vendor to design the logic in such a way that after tripping any shutdown valve, the valve shall not open automatically until the signal causing the trip is normalized and the operator opens the valve using manual reset of that particular valve.</p> <p>4.4 <u>System Requirements:</u></p> <p>4.4.1 Surface Safety Valve (SSV) Control System:</p> <p>4.4.1.1 The control signal for Surface Safety Valve (SSV) control system shall be as per clause 4.3.4 above and the supply for the SSV control system shall be either pneumatic or hydraulic as per clause no. 4.2.3 or 4.2.4 above respectively.</p> <p>4.4.1.2 Each SSV circuit shall have a permit circuit connected to its associated SSSV circuit, to prevent the SSV opening before the SSSV as well as to shut the SSV, if the hydraulic pressure to the SSSV is interrupted or decreased. This circuit shall consist of a high-pressure hydraulic pilot, timing system and 3-way valve. This pilot shall be set at approximately 200 kg/cm<sup>2</sup>g.</p> <p>4.4.1.3 The bulkhead fittings to the individual SSV shall be suitable for 3/8” O.D. 6000# tubings.</p>				
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<p>4.4.2 Sub-Surface Safety Valve (SSSV) Control System:</p> <p>4.4.2.1 The control signal for Sub-Surface Safety Valve (SSSV) control system shall be as per clause 4.3.4 above and the hydraulic supply for the SSSV control system shall be as per clause no. 4.2.4 above.</p> <p>4.4.2.2 The SSSV control system shall comprise of SSSV equalize system and SSSV primary system.</p> <p>4.4.2.3 <u>SSSV Equalize System:</u></p> <p>4.4.2.3.1 The purpose of this system is to apply initial pressure to the SSSV, to enable the difference in pressure between primary system and start-up system to equalize, without applying unnecessary shock to the SSSV. A manual 3-way selector valve shall be provided on the panel front to select primary / start up header.</p> <p>4.4.2.3.2 The bulkhead fittings to the individual SSSV shall be suitable for 3/8" O.D. 316 SS tubing and their rating shall be 6000#.</p> <p>4.4.2.4 <u>SSSV Primary System:</u></p> <p>4.4.2.4.1 The SSSV primary loop shall be connected to SSSV start-up loop. The SSSV primary loop shall not have entry to the SSSV till the SSSV equalize pressure is obtained. This shall be automatically achieved by use of hydraulic pilot.</p> <p>4.4.2.4.2 The SSSV's shall be provided with redundant return line connected to redundant return header. This header shall be provided with relief valve and pilot valve. The pilot valve shall operate from SSSV shutdown system with suitable adjustable time delay.</p> <p>4.4.2.5 <u>Hydraulic System for SSSV ( and for SSV system wherever applicable):</u></p> <p>4.4.2.5.1 The hydraulic system shall consist of pumps, reservoir, accumulators, headers and other accessories as required. The relief valve shall be provided in the system based on design pressure given elsewhere. The reservoir and accumulator sizing is to be carried out by the Vendor and all calculations are to be submitted to company for approval. Pump exhaust shall be vented outside the panel through flame arresters in case instrument gas is used.</p> <p>4.4.2.5.2 The accumulator header shall be 1" XXX SS 316 with 6000# SS 316 fittings. The hydraulic tubing shall be 316 SS 3/8" OD with 0.049" wall thickness.</p>				
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<p>4.4.2.5.3 Pneumatic ( electrical type where PLC based SDP is asked in the scope of work) pressure pilot shall sense low hydraulic pressure in the system and it shall cause shutdown in the same way as defined for PSL on instrument air/gas header.</p> <p>4.4.2.5.4 Hydraulics supply to header shall be through line size dual filters with necessary isolation and differential pressure indication. Hydraulic fluid shall meet its functional requirement in high pressure application as described in the scope of work.</p> <p>4.4.2.5.5 All hydraulic pumps shall be gas/air driven as well as hand operated. Each pump discharge shall be provided with relief valve and external check valves. Each pump-suction shall have suction strainer and differential pressure gauges across it. The pump for start up header shall have panel front mounted filter regulator.</p> <p>4.4.2.5.6 Wherever regulators are used to derive a particular pressure level the same shall be achieved using dual redundant isolation valves, regulators and relief valves.</p> <p>4.4.2.5.7 The accumulators shall be provided to take care of leakage in the system and shall be capable of one operation of all valves of one dual completion well in case of failure of hydraulic pumps. Accumulator shall be SS316.</p> <p>4.4.2.5.8 The accumulators shall be provided with isolation and drain valves.</p> <p>4.4.2.5.9 Each pump exhaust shall be tube connected to the panel exterior with suitable exhaust header.</p> <p>4.4.2.6 <u>Reservoir System for SSSV ( and for SSV system wherever applicable):</u></p> <p>4.4.2.6.1 The reservoir shall have an oil volume of 75 litres minimum Vendor to check and provide correct volume as required considering future requirements and adequate air gap. The reservoir system components shall be in SS 316 material.</p> <p>4.4.2.6.2 A relief tube, properly sized shall be placed between the hydraulic drain header and the reservoir.</p> <p>4.4.2.6.3 The reservoir shall have the following accessories:</p> <ul style="list-style-type: none"><li>i) Oil filter strainer for fill in connection</li><li>ii) Air filter/flame arrester</li><li>iii) Sight glass</li><li>iv) Drain plug</li><li>v) Clean out opening</li></ul>				
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<p>vi) The common drain header shall be 3/4" Sch. 40 316 SS pipe.</p> <p>vii) The reservoir system shall include pneumatic gas / air driven pumps with a hand pump to keep the hydraulic system pressurized for opening SSVs / SSSVs.</p> <p>viii) Low level switch (potential free contacts)</p> <p>4.4.3 ESD / FSD System:</p> <p>4.4.3.1 The ESD and FSD Systems shall be pneumatic in general. The control signal for these systems shall be as per clause no. 4.3.4 above.</p> <p>4.4.3.2 The SDP shall accommodate the charging and detection system for ESD on the platform. One manually actuated ESD valve shall be mounted on the panel to perform ESD functions. Panel shall have provision for quick charging facility of ESD loop.</p> <p>4.4.3.3 The SDP shall accommodate the charging and detection system for FSD and Fusible Plug Loop on the platform. One manually actuated FSD valve shall be mounted on the panel to perform FSD and Fusible Plug Loop functions. Panel shall have provision for quick charging facility of FSD and Fusible Plug loop.</p> <p>4.4.4 Telecontrol System:</p> <p>4.4.4.1 Explosion-proof cum weatherproof pressure switches shall be provided in the panel for telemetry of the required parameters.</p> <p>4.4.4.2 Explosion-proof cum weatherproof solenoid valves shall be provided in the panel for tele control of the required parameters. These solenoid valves shall be pulse operated, magnetically latched type and shall not draw continuous power in both the open and closed states.</p> <p>4.4.4.3 RTU bypass valves shall be provided at the back of the panel with wire seal to prevent inadvertent operation.</p> <p>4.4.5 Components and Construction of the Shut Down Panel:</p> <p>4.4.5.1 <u>Panel Construction:</u></p> <p>4.4.5.1.1 The Shut Down Panel shall be Removable Modular type, Skid-mounted and Free standing. The Panel shall be of Welded construction. Acrylic cover door with hinges shall be provided for front protection each module of SDP.</p> <p>4.4.5.1.2 The Panel front shall be smooth and flat. Stiffeners shall be provided wherever required to prevent buckling due to weight while operating the switches.</p>				
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<p>4.4.5.1.3 To ensure rain tightness, cracks around bolts, lifting eyes, panel-mounted instruments etc. shall be sealed with suitable media.</p> <p>4.4.5.1.4 The bulkhead fittings and electric conduit connections shall be located on the Left/ Right side of the panel.</p> <p>4.4.5.1.5 The panel shall have lifting eyes to facilitate handling during transportation and installation.</p> <p>4.4.5.1.6 All internal braces and supports shall be fabricated from stainless steel.</p> <p>4.4.5.1.7 The panel shall be of welded construction all around and all buff welds are to be ground smooth. Filter welds require no grinding provided they are neat in appearance.</p> <p>4.4.5.1.8 The double door type panel shall have swing out rear doors hinged with a continuous stainless steel hinge fully gasketed and held closed with a heavy T bar latch. The panel door shall also have lock and key arrangement. The Back-side Door shall be opened fully without any hindrance and latching mechanism to held the door open position for O&amp;M purposes.</p> <p>4.4.5.1.9 The panel shall be self-standing with channel frame at the base to support all the heavy items such as pumps, accumulator reservoir. A drip pan with ¾” drain valve shall be provided covering entire base of panel.</p> <p>4.4.5.1.10 The components mounted on the panel shall be easily accessible for routine maintenance with minimum tubing removal. All panel front components required for operation and operator's observations shall be mounted at 600 to 1800 mm elevation from grade.</p> <p>4.4.5.1.11 Engraved name plates shall be fixed by SS 316 screws at appropriate positions.</p> <p>4.4.5.1.12 Arc suppression diodes shall be provided across solenoid valve terminals.</p> <p>4.4.5.1.13 Cable entry size for solenoid valves provided for gas detection system shall be 3/4” NPT (F).</p> <p>4.4.5.1.14 Separate junction boxes shall be provided outside on the panel for telemetry and telecontrol parameters. Multicore cable entries to each junction box shall be 1 ½” NPT (F) minimum. Junction Box to be located outside /inside(preferably) on the Shut Down Panel.</p> <p>4.4.5.1.15 The tubing within the panel shall be:</p> <ul style="list-style-type: none"><li>i) 3/8” OD x 0.049" for ESD/FSD Loop</li><li>ii) 3/8" OD x 0.049" for Hydraulic tubing</li><li>iii) 1/4" OD x 0.035" for other pneumatic tubing</li></ul>				
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<p>4.4.5.1.16 The tubing shall be SS 316, seamless &amp; fully annealed. Double ferrule 316SS tube-fittings with ASTM-F-1387 compliance of reputable make from ONGC approved vendor list shall be used and shall be as per FS-3507 (FS for Instrumentation Bulk Material).</p> <p>Fittings/ tubing / Instrument valves and accessories shall meet all the functional requirements of FS-3507.</p> <p>4.4.5.1.17 External connection for SSSV, SSV, ESD Loop and FSD Loop shall be suitable for 3/8” OD 316 SS tubing and for other shall be suitable for 1/4" OD 316 SS tubing.</p> <p>4.4.5.1.18 All components and logic devices inside the panel shall be made of SS 316. Block and bleed logics / relays shall be used.</p> <p>4.4.5.1.19 The panel shall provide the following, in case of abnormal process conditions:</p> <p>a) Visual indication</p> <p>b) Audible alarm (the alarm shall sound for a maximum of 3 minutes, unless reset earlier)</p> <p>4.4.5.1.20 The pneumatic supply header shall be 3/4" SS 316 pipe. A 1/2" drain valve shall be provided at the end of supply header opposite to the supply connections. The pneumatic supply to the panel shall be through dual filter regulators with isolation valves, pressure gauges, shuttle valve and relief valve.</p> <p>4.4.5.1.21 Low instrument air/gas supply pressure in the panel shall be sensed by pneumatic pressure pilot (set @ 5 kg/cm<sup>2</sup>g) and it shall cause shutdown in same way as defined for PSL on Instrument air/gas header.</p> <p>4.4.5.1.22 The panel shall provide a manual by pass for individual relays except ESD, FSD, low hydraulic pressure, and low pneumatic pressure in panel, 60% LEL in gas detection system and 50-ppm H<sub>2</sub>S signal in case of platform handling Sour Well Fluid. These manual bypass valves shall be provided at panel back with wire seal.</p> <p>4.4.5.1.23 Manual override facility (for start up alone) shall be provided, for all trip conditions, except, ESD, FSD, 60% LEL gas, and 20-ppm H<sub>2</sub>S detection (in case of platform handling sour well fluid). This shall release as soon as the trip condition returns to normal.</p> <p>4.4.5.1.24 All incoming and outgoing signals shall be as per approved P&amp;IDs &amp; SAFE Chart, and other sections of this Bid document. The Vendor shall check and provide all logic and all other components as required.</p> <p>4.4.5.1.25 All Remote operated solenoid valves except remote ESD XSV shall be provided with Block and By-pass Valves.</p>				
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<p>4.4.5.1.26 Manual shut-in / Reset valve shall be provided for each SSV, SSSV, XSDV and any other output for shutdown purpose.</p> <p>4.4.5.1.27 All manually controlled valves shall be panel front mounted.</p> <p>4.4.5.1.28 Local closing facility for Main line XSDV shall be provided.</p> <p>4.4.5.1.29 Panel front mounted liquid filled pressure gauges shall be provided, for pneumatic supply pressure, hydraulic supply pressure, each input signal pressure and each output signal pressure. All pressure gauges are to be provided with isolation valves.</p> <p>4.4.5.1.30 Laminated photocopy of the Logic diagram shall be pasted on the inside of the SDP door.</p> <p>4.4.5.1.31 The indicative dimensions of the Shut Down Panel shall be as follows: (contractor shall submit panel internal layout for approvals)</p> <div style="margin-left: 40px;"><p>Width: As per no. of modules as described in scope of work.</p><p>Height: 2000 mm</p><p>Depth: 1200 mm</p><p>Door Width: 600 mm (max.)</p></div> <p>4.4.5.2 <u>Junction Box Details:</u></p> <p>4.4.5.2.1 All electrical components in the shut down panel shall be housed in SS316 with explosion proof junction box, preferably vertically mounted inside the panel.</p> <p>4.4.5.2.2 The junction box shall house all electrical components that are a part of the shut down panel. This junction box shall be constructed as per FS-3507 and shall be explosion proof to NEMA 7.</p> <p>4.4.5.3 <u>Well Control Module Requirements:</u></p> <p>4.4.5.3.1 The number of Well Control Modules (WCM) required shall be as per the Basic Bid Work.</p> <p>4.4.5.3.2 Each well control module shall have following facilities as a minimum:</p> <ul style="list-style-type: none"><li>• Manual shut in/Reset for each SSV</li><li>• Manual shut in/Reset for each SSSV</li><li>• Control Supply Pressure Gauge for each SSSV</li><li>• Control Supply Pressure Gauge for each SSV</li><li>• Remote opening / closing of each SSV</li></ul>				
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<div><ul style="list-style-type: none"><li>• Three-minute time delay for SSSV shut in, in case of simultaneous shut in of SSV and respective SSSV.</li><li>• Start up and primary manifold</li><li>• All incoming lines to module shall be provided with isolation / check valves before entry to module to facilitate removal for maintenance purpose.</li><li>• Lift Gas and / or Water Injection control logic as per requirement</li></ul></div> <div>4.4.5.3.3 In-built Gas Lift Logics shall be incorporated in all well control modules, including all spare well control modules irrespective of type of well.</div> <div>4.4.5.3.4 At least one spare well control module shall be provided if not indicated in the basic bid work.</div> <div>4.4.5.4 <u>Indicating System:</u></div> <div>4.4.5.4.1 The Shut Down Panel shall provide first-out visual indication and audible alarm in case of any abnormal process condition.</div> <div>4.4.5.4.2 Pneumatic horn shall be provided for audible horn. The horn shall be mounted at the top of the panel. The horn shall sound for a maximum time of three (3) minutes unless reset earlier.</div> <div>4.4.5.5 <u>Instruments for future facilities:</u></div> <div>4.4.5.5.1 The Contractor shall provide all panel mounted instruments and accessories required for future facilities. The Contractor shall also carry out necessary hook-up inside the panel, related to spare module.</div> <div>4.4.5.5.2 The Contractor shall also provide all other materials / equipment (e.g. Interconnecting cables, junction boxes, cable glands, etc.) required to make the Shut Down Panel complete and functional.</div> <div>4.4.5.5.3 <u>Inside the Shut Down panel, lay out of the instruments and accessories shall be in a manner that all the items and terminals and fittings shall be directly accessible for maintenance.</u></div> <div>4.4.6 <u>PLC based Shutdown panel :</u></div> <div>4.4.6.1 PLC based shutdown panel if specified in the scope of work, PLC unit shall be provided as per FS-C101 and the unit shall be placed in safe location. Pneumatic shutdown panel unit shall be located in the field and to be integrated with PLC with suitable interfaces.</div>				
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<p>4.4.6.2 All the field instruments ( PSHL, PT, DPT, TT, FT, etc ) shall be electronic type as per P&amp;IDs and scope of work. Signals from PSHLs shall be directly hooked up with PLC. All the functional Logics shall be executed in PLC only . However, the related output signal ( pneumatic/ hydraulic) to field instruments shall be processed in Pneumatic shutdown panel unit at site.</p> <p>4.4.6.3 Overall architecture diagram shall be developed by the contractor/vendor based on functional requirement as indicated in P&amp;IDs, scope of work and this FS-3501 and shall submit to company for approval prior to submission of purchase specification (PS) for Shutdown Panel.</p> <p>4.5 <u>Material:</u></p> <p>4.5.1 The material requirements for Shut Down Panel shall in general be according to clause 3.6.4.5 of Instrumentation Design Criteria.</p> <p>4.5.2 The material of construction of the various components of the Shut Down Panel shall be as follows:</p> <table><tr><td><u>Item</u></td><td><u>Material</u></td></tr><tr><td>Skid</td><td>: Carbon Steel</td></tr><tr><td>Panel</td><td>: 4.0 mm thick SS 316 ( with compatible panel door), only, pulse operated SOVs shall be SS 430F.</td></tr><tr><td>Components inside the panel</td><td>: SS 316 (shall meet the requirement of NACE MR-01-75).</td></tr><tr><td>Junction Box</td><td>: As per FS-3507.</td></tr></table> <p>5.0 EQUIPMENT PROTECTION:</p> <p>5.1 <u>Shut Down Panel protection requirements shall be as per clause no. 3.6.4.4 of Instrumentation Design Criteria.</u></p> <p>5.2 Panel shall be weather proof to NEMA 4X.</p> <p>5.3 Electronic / electrical components like solenoid valves, electric pressure switches, junction boxes etc., mounted on the panel shall be weatherproof and explosion proof as per cl 3.6.4.4 of Instrumentation Design Criteria.</p>				<u>Item</u>	<u>Material</u>	Skid	: Carbon Steel	Panel	: 4.0 mm thick SS 316 ( with compatible panel door), only, pulse operated SOVs shall be SS 430F.	Components inside the panel	: SS 316 (shall meet the requirement of NACE MR-01-75).	Junction Box	: As per FS-3507.
<u>Item</u>	<u>Material</u>												
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<p>6.0 INSTALLATION REQUIREMENTS:</p> <p>6.1 The installation of Shut Down Panel shall in general be according to clause 3.6.4.6 of Instrumentation Design Criteria.</p> <p>6.2 All components, which require regular maintenance and / or monitoring, shall be easily accessible by operations &amp; maintenance personnel, with minimum wiring removal.</p> <p>6.3 Maintenance space requirement shall be kept to a minimum.</p> <p>7.0 CALIBRATION, INSPECTION &amp; TESTING:</p> <p>7.1 Calibration, inspection and testing requirements shall in general be as per clause 3.6.4.7 of Instrumentation Design Criteria. In addition, the following shall also be taken care of:</p> <p>7.2 Panel shall be completely finished, piped and tested by the Vendor before submitting for inspection. The panel testing prior to inspection shall be as follows:</p> <ul style="list-style-type: none"><li>• All pneumatic lines and hydraulic lines shall be tested, for leaks by applying 1.5 times the maximum working pressures.</li><li>• Wiring Checks (Loop Checks), Continuity Checks</li><li>• Utility Consumption</li><li>• Internal resistance check and insulation checks for electrical circuits</li><li>• Insulation test shall be done for wiring inside the panel.</li><li>• Simulation and full functional test (Panels shall be tested by simulating actual operating conditions.)</li><li>• Any additional tests as laid down by the Company</li></ul> <p>7.3 The Vendor shall perform all other test as required, to place the panel in operating condition.</p> <p>7.4 In addition to the tests listed above any other test(s) required for approval shall be performed to the satisfaction of Purchaser or his representative before shipment.</p> <p>7.5 Sufficient time, ample space and necessary assistance shall be provided by the Vendor to assure inspection and testing to the satisfaction of the Purchaser or his Representative.</p> <p>8.0 DOCUMENTATION:</p> <p>8.1 The documentation requirements shall in general be according to clause 3.6.6.2 of Instrumentation Design Criteria.</p>				
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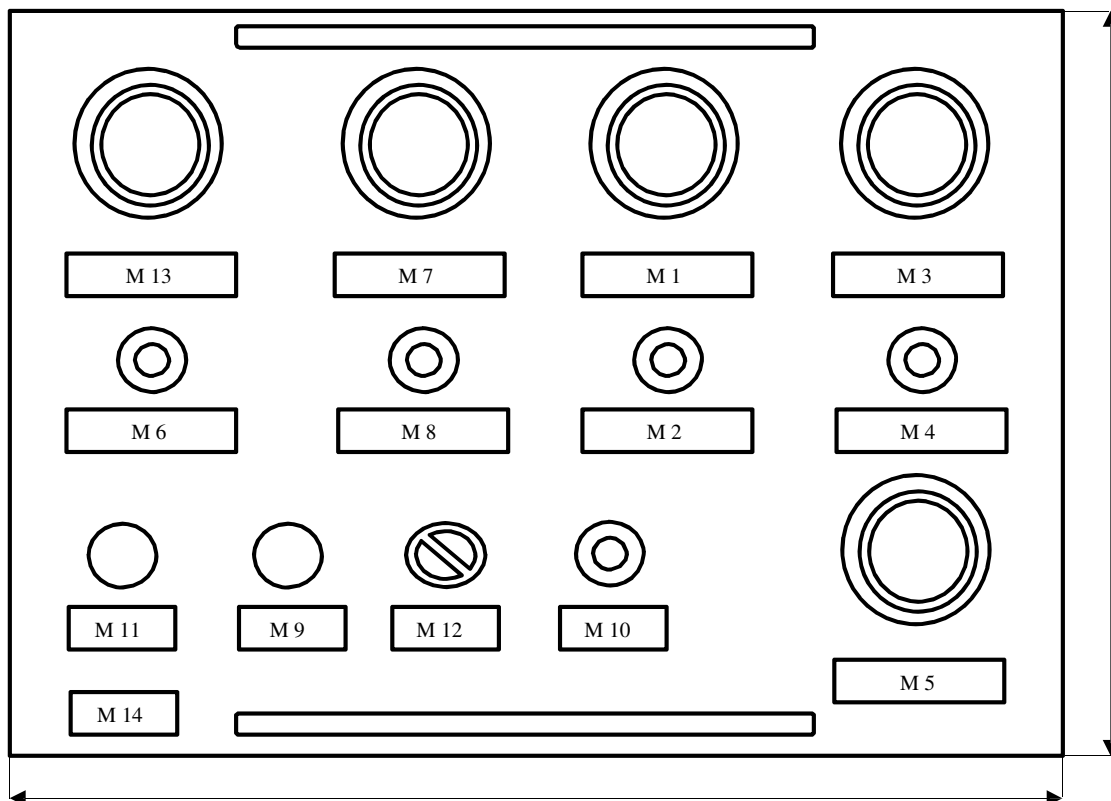


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<p>8.2 The Contractor shall obtain Company’s approval for overall architecture diagram for all well fluid data monitoring &amp; controls as per scope of work, panel logic diagrams, sizing calculations for reservoir and accumulator, before proceeding with the panel fabrication.</p> <p>8.3 The Contractor shall submit complete QA / QC plans for the proposed Shut down panel for Company’s review / approval.</p> <p>8.4 The Supplier, and his sub-supplier, shall operate a quality system satisfying the applicable provisions of BS5750/ISO 9000 (series). A detailed quality plan shall be provided with the bid.</p> <p>8.5 The purchaser reserves the right to carry out quality and technical review at both supplier’s and sub-supplier’s works.</p> <p>9.0 TAGGING &amp; NAMEPLATES:</p> <p>9.1 Tagging &amp; Nameplate requirements shall in general be according to clause 3.6.6.1 of Instrumentation Design Criteria.</p> <p>9.2 All major equipment shall have identifying nameplates firmly fixed on them.</p> <p>10.0 REVIEW &amp; APPROVAL:</p> <p>10.1 Review and approval of purchase specifications and other related documents shall in general be according to clause 3.6.6.3 of Instrumentation Design Criteria.</p> <p>11.0 VENDOR PRE-QUALIFICATION REQUIREMENTS:</p> <p>11.1 The Vendor pre-qualification requirements shall in general be according to clause 3.6.6.4 of Instrumentation Design Criteria.</p> <p>12.0 PREPARATION FOR SHIPMENT:</p> <p>12.1 The Shut Down Panel shall be prepared for shipment in accordance to clause 3.6.6.5 of Instrumentation Design Criteria.</p> <p>13.0 RECEIPT &amp; STORAGE:</p> <p>Receipt and storage of the Shut Down Panel shall be in accordance to clause 3.6.6.6 of Instrumentation Design Criteria</p>				
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**ANNEXURE – I**  
**TYPICAL WELL CONTROL MODULE (WCM) LAYOUT**



ITEM	DESCRIPTION	QUANTITY	SIZE (INDICATIVE)	COLOUR
M1	PSHL-XXX Flow line Pressure Gauge	1 (Per Module)	70 x 20	White
M2	PSHL-XXX Flow line Status	1 (Per Module)	70 x 20	White
M3	PSHL-XXX L/G Injection Pressure Gauge	1 (Per Module)	70 x 20	White
M4	PSHL-XXX L/G Status	1 (Per Module)	70 x 20	White
M5	XSDV-XXX Output Pressure Gauge	1 (Per Module)	70 x 20	White
M6	SSSV-XXX Output Status	1 (Per Module)	70 x 20	White
M7	SSV-XXX Output Pressure Gauge	1 (Per Module)	70 x 20	White
M8	SSV-XXX Output Status	1 (Per Module)	70 x 20	White
M9	Push to Shut In / Pull to reset SSV/XSDV-XXX	1 (Per Module)	70 x 20	White
M10	SSV-XXX Remote S/D Status	1 (Per Module)	70 x 20	White
M11	Push to Shut In / Pull to reset SSSV/SSV-XXX	1 (Per Module)	70 x 20	White
M12	Start-up Primary Selector	1 (Per Module)	70 x 20	White
M13	SSSV-XXX Output Pressure Gauge	1 (Per Module)	70 x 20	White
M14	Well-XXX	1 (Per Module)	70 x 20	White