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HVAC for OFFSHORE PLATFORMS

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Consultant

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In 1993 he joined the same company and worked on a very large platform for Qatar Liquified Petroleum Co. and later on several other projects including two for ONGC, India. He retired in 2002 and now lives in his native Kerala. He can be contacted at ***rvndrn@sancharnet.in***

System and Equipment Selection

In case of an installation comprising of more than two decks, it is preferable to go for a chilled water system and air handling units, one for each level, considering controllability and with a view to reduce complications that can result with deck penetrations for ducting.

Fan coil units will tend to result in a very high cost installation, due to the pressurization requirements, as an air handling unit for pressurization will in any way be required.

There are only two plus points for an installation with fan coil units. One is individual controls for each area and two, reduced duct sizes plus the absence of return ducts. The first one is not very important for any offshore installation, as people are basically of floating nature, not staying more than 3-4 weeks at a stretch. The second one, that is reduced duct sizes plus absence of return air ducts, also is not of much significance, as the percentage of fresh air will be relatively high due to pressurization requirements and hence there will not be much difference in duct sizing. In fact availability of return air ducting will provide better control of the pressurization requirements. (In accommodation platforms, fresh air percentage over total supply air will be generally in the range of 50 to 75% for installations where pressurization is critical).

In case a common air handling unit is selected for serving more than one deck, there will be ducts penetrating fire rated decks, necessitating provision of fire dampers. Of course, this is a point where the overall size of the installation will be the deciding factor for the selection of number of air handling units.

Air Handling Units and Fans. Due to the importance of pressurization, air handling units are considered to be the most important HVAC equipment, particularly in installations in hazardous areas or where toxic gases can be present. Fans shall be of spark proof construction and be driven by motors designed for classified areas. Cooling/ heating takes only second preference.

Since standby equipment is essential for more critical equipment such as air handling units, (particularly where pressurization is involved) battery room exhaust fans etc., one often comes across a scenario, where there is no space available for installing two air handling units. Since filters, cooling and heating coils etc. are stationary equipment, air handling units can be considered with dual fans, as shown in **Figure 1**, one operating and one standby, with shut off and non return dampers at the inlet and outlet. Shut off dampers have to be provided at the inlet to the fans to ensure non-short circuiting of air flow. These dampers are best provided with pneumatic actuators as instrument air supply will be usually available on such platforms. Pneumatic actuators are preferred, as zone classified electric motor driven dampers will be costlier and more cumbersome to operate and maintain.

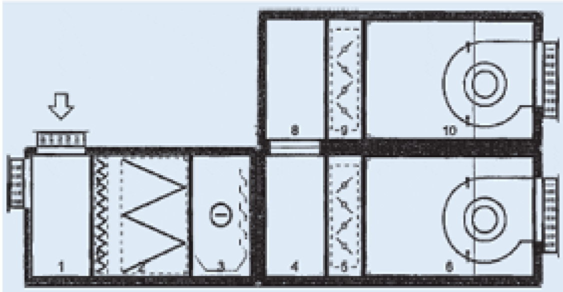

Figure 1 : Schematic arrangement of air handling unit with duty & standby fans.

Specialist manufacturers of such air handling units are : FlaktWoods, Direct Engineering (Australia), Heinen and Hopman (Netherlands) SKM (Sharjah, UAE).

Duty and standby exhaust fans shall also have non return dampers, either gravity operated or electric/ pneumatic actuated, at the outlets. Type of actuation shall be based on the control philosophy.

Condenser Cooling. A water-cooled condenser is preferred only if adequate sea water is available from the sea water pumping system available on the platform. To provide a dedicated sea water circulation system only for the HVAC system will not be worthwhile, due to the high cost involved. Hence inputs from the platform designer will be required to decide on this point.

In case a water-cooled condenser is chosen, it will be preferable to go for a plate heat exchanger with sea water on the primary side and fresh water on the secondary side, in a closed loop circulating fresh water through the condenser tubes. Though, an additional equipment in the form of a plate heat exchanger is used, the additional space requirement will be negligible, besides the advantage that plate heat exchangers are not rotating equipment and hence maintenance and power requirements are nil. With a 3 way valve in the sea water pipe connections to the heat exchanger, fresh cooling water at constant temperature can be made available for cooling the condenser, thereby enabling us to optimize the performance of the chillers. Further, condenser tubes will not have to be of cupro-nickel, and a normal copper tube condenser will do the job. Plates of the plate heat exchanger shall be of titanium of suitable grade.

Air-Cooled Condensers. For small size plants, say of less than 50 ton capacity, air-cooled condensers are still preferred, mainly due to the cost factor and space constraints. The condenser coils shall be of copper tubes and copper fins, electro tinned after assembly, or with ARCACLAD or equivalent coating to reduce the impact of corrosive atmosphere. Aluminium fins are not recommended due to poor corrosion resistance in a marine environment.

Air-cooled condensers installed in hazardous areas shall have to be suitably rated.

Compressors. For systems to be installed in safe areas, selection of compressors can follow the parameters generally applied for any typical installation onshore. However, for installations in *zone 2* classified areas, open compressors will be the most acceptable choice, as only then can the electrical requirements be met. Direct driven compressors are preferred, though belt drive is also acceptable, if anti-static drives are selected. All control elements such as pressure switches, crankcase heater termination, solenoid valves etc shall comply with, at least zone 2 requirements. Some project specifications insist on flameproof enclosures for these control elements, (like Shell) though the same is more than what is required for an application in zone 2 areas.

Interestingly, some of the US specifications prepared by companies like Mobil, accept semi-sealed compressors for machines of capacity less than 7.5 ton, for classified areas comparable to *zone 2* (US classifications of hazardous areas are based on divisions based on gas groups), even though the terminal box of a semi-sealed compressor will not meet with the *zone 2* requirements.

Wherever the chillers or condensing units can be installed in pressurized areas, compressors of any type can be installed, provided it is ensured that the compressors will function only when the space is pressurized. However, crankcase heaters can pose a problem, as the heaters will be switched on whenever the compressor is switched off.

Refrigerant Piping. Copper piping can be used for refrigerant piping, with protective coating, to withstand corrosive marine atmosphere, in line with the project painting specifications, which is an important document on any offshore project.

Fresh Air Inlets to air handling units should have coalescing filters/demisters capable of separating salt laden moisture particles to reduce corrosive effects within the air handling units. The norms generally followed are (i) to reduce the salt in air concentrations to 0.05 ppm by weight from an input of 3.6 ppm, based on NGTE (National Gas Turbine Establishment, USA) Standard 30 knot aerosol and (ii) dust particle removal efficiency of 98% at 6 microns to BS 540 Part I or equivalent.

Dampers (fire dampers, shut off dampers, motorized non return dampers). Pneumatic actuation is preferred for these dampers. It is easier to provide zone-classified solenoid valves for pneumatic actuation, as compared to electrical actuation. The physical size of such solenoid valves have come down very considerably over the years.

Control System. With the developments that have taken place in the microprocessor-based controls, during the last decade, it has become far easier to carry out the engineering hook up with the platform control system, so as to monitor the operation of HVAC plant, with particular reference to the fire dampers, as they form an integral part of the platform safety system. Starting and stopping of the HVAC system will be done with the help of a PC through the central control system. Selection of the HVAC equipment has to be done keeping in view this requirement.

Reheat Control. As distinct from an ocean going vessel, a platform is installed in one location of the oil field, and therefore constant volume airflow systems are generally provided. Hence reheat controls may be necessary for maintaining relative humidity, particularly in equipment rooms where fluctuations in equipment heat gain can be expected. Duct heaters can be installed in pressurized areas, without having to go for hazardous area classification, since the operation of the heating element will be interconnected to ensure the switching on of the heaters only when the area surrounding the heaters is also pressurized. However there are differences of opinion on this aspect. Zone-classified duct heaters are extremely costly and hence the above basis of pressurized area operation is getting acceptance in most of the cases. This point is however, a grey area.

Humidifiers. These find application generally in North Sea installations. The cost involved in providing humidifiers, complying with the corrosion resistance specifications does not justify provision of humidifiers in tropical zones such as in Indian waters, as they will be functional only for very short duration in a year. Hence this item is not dealt with in detail.

Constant Volume Boxes (CVBs). Provision of constant volume boxes is optional for low pressure systems, at the discretion of the owner, as this will have a cost impact. For high pressure systems, CVBs are essential. Providing CVBs is quite beneficial as frequent air balancing can be avoided, thereby saving a lot of energy and maintenance requirements for the owner. With CVBs installed in the air distribution system, one can be certain that the system will very rarely get out of balance and the frequency of rebalancing, which is a very time consuming process in working platforms, can be considerably reduced. These CVBs can be fitted with terminal reheating equipment as well, if needed. Acoustic lining can also be provided on the internal surface of these boxes.

In India, these boxes have not found much application, maybe due to the cost factor. There are three types of boxes – the simplest one incorporates bellows, which operate a damper ensuring constant outflow, sensed by the pressure differential acting on the bellows. Trox, UK used to make them, but of late they have discontinued manufacturing this type. Then there are two other types, one is electrically operated and the other one is pneumatically actuated. The working principle is the same for all the three, with only the type of actuation differing from one another. Of course, the cost of installation of these latter two types of CVBs will be much higher due to the electrical wiring and instrument air piping involved.

Battery Room Ventilation. In any offshore installation the battery room is a very important area, to ensure emergency power in the event of a power breakdown. Apart from keeping the most essential services running without any break, emergency lighting and ventilation systems have to be fed with emergency power to aid safety operation, if need arises. Though cooling may not be required in emergency periods, ventilation to maintain life with least discomfort has to be ensured.

Battery rooms will require ventilation to keep the level of hydrogen within safe limits, though recent developments have resulted in reducing the hydrogen output considerably. Basic design parameters are:

- Maintain at least 12 air changes per hour.
- Work out the hydrogen emission rate of the batteries

and the ventilation equipment should have a capacity more than the hydrogen emission rate, after allowing for percentage of hydrogen in the air. This is done either based on the data given by the battery supplier or worked out using the formula $Q = 55 \times h \times I$ where 'Q' is the air flow in liters per hour, 'h' is the number of cells, 'I' is the charging current at the end of high rate charging, but not less than 25% of rated charge output. (Ref: DIN VDE0510).

- In case of non-air conditioned battery rooms, the ventilation rate should be such that the inside temperature should be less than 5°C above the ambient conditions.

Since battery rooms also have to be pressurized to prevent entry of hazardous fumes from outside, positive supply of fresh air from a safe area is essential. Cooling or heating is generally not done for battery rooms, on Indian platforms. Both supply and exhaust fans shall have duty plus standby arrangement, with preferably a duty change over control system.

Exhaust Systems for Kitchen, Toilets, Clinic Rooms Etc. The system design for above will be generally as per any land installation. For kitchens, where high equipment heat gain is expected for short duration, twospeed exhaust fans, connected to the kitchen hood are provided, which will run at low speed during noncooking periods. These fans will be switched over to high speed when the cooking operations are in progress. At the time of such high-speed operation of the exhaust fans, a supply fan will make up the extra quantity of air to the exhaust hood to achieve proper air balancing.

Air Distribution

A well-designed air distribution system will result in an efficient air conditioning system, that can maintain uniform conditions throughout the space. While this principle is the same as that for installations onshore and offshore, the following factors can be considered as special requirements for offshore installations :

High Pressure Ducting. Due to space constraints and considering the air flow requirements, the designer may have to go for high pressure ducting, in large installations, such as large living quarters (occupancy more than 50), as the pressure drop in supply air ducting will be in the range of 1000 to 1500 Pa and that in return air ducting will be in the range of 500 to 1000 Pa. Circular ducting (machine fabricated by using GS strip bands of 100 or 150 mm width) is recommended, as the helically wound longitudinal joints provide adequate mechanical strength. Constant volume boxes described earlier in this writeup are essential wherever high pressure ducting is required.

Safe Area from where Fresh Air can be Drawn. Fresh air shall never be drawn from hazardous areas. It shall be drawn only from safe areas. Generally, when the location of a platform is finalized, the normal wind direction will be considered, to have a passive protection, i.e. air currents which can contain toxic or poisonous gases do not enter into the living quarters and surrounding areas. If the normal wind direction is from south west to north east, for example, the gas or oil wells and flares will be on the north east side of the living quarters, which will be installed on the south west side.

Please refer to an earlier paragraph on the classification of hazardous areas.

Exhaust air from any exhaust system shall not be discharged into any classified area.

Duct Work

Material of Construction of Ducts. General practice is to use galvanized steel sheets with relatively heavier deposition of zinc (not less than 270 gms/m^2, as per Table 9 of BS 2989 coating mass or weight) for internal ducting and stainless steel grade 316L for external ducting. “A60” fire rated ducts, even indoors, shall be of minimum 5mm thick stainless steel grade 316L. Exhaust ducting from battery rooms shall be of stainless steel grade 316L. Corrosion resistance and reducing chances of damage and limiting expenditure involved, which will be very high in case of any repairs in future, are the criteria for selecting the above materials.

Fabrication of Ducts. SMACNA or DW 144 or any other recognized fabrication standard can be followed. Wherever lockforming is resorted to, all such joints shall be applied with asbestos-free duct sealant. Fire rated ducts shall be of welded construction, with a minimum thickness of 5 mm for the mild steel sheets used.

Pressure or Leak Tests of Ducts. While carrying out pressure testing or leak testing is a welcome step, the extra cost and time involved does not justify carrying out the above tests, as is clearly mentioned in SMACNA. DW 143 test procedures prefer to have pressure or leak tests. It will be preferable to have a close look at the fabrication standards and to supervise continuously the quality of labour in providing longitudinal and transverse joints, flanges, slip joints etc. However, for high pressure ducts above 1000 Pa, it will be advisable to conduct such tests for all duct pieces.

Further, carrying out vapour barrier treatment over insulation of ducts installed after carrying out such tests, will pose certain problems due to space available for carrying out a good job, due to normally available gap between top of the duct and the deck above and the presence of other services, such as cable trays, etc. A poor vapour barrier treatment will do more harm than the advantages obtained from pressure or leak testing, due to the damage moisture droplets can cause to costly electrical and instrumentation devices. This is an entirely practical problem at site, as fitting into the overall schedule and coordinating all services will be an impossible task, as usually, delivery and completion period will get upset incase testing of ducts has to be done. As per the personal experience of the writer, testing does not serve any tangible purpose, except a personal satisfaction of having carried out the testing. Still, at least 50% of the total number of joints will not be able to be tested, as attempting to test one duct system as a whole before insulation, will be a very impractical procedure.

Pressure Relief Dampers. Pressure relief dampers shall be installed generally in air locks, to ensure that the space is not overpressurised. In case air locks are not provided near large areas covering an entire deck, then pressure relief dampers shall be installed on walls of such rooms. This is required to limit damage to external doors and to facilitate easy operation of the doors. These dampers can be either spring type or preferably weight operated type.

Balancing and Volume Control Dampers. Adequate number of balancing and volume control dampers shall be provided to facilitate balancing of airflow, as pressurization gets precedence over inside conditions in most of the cases. Material of construction of these dampers shall be compatible with the ducting material to which the damper is fixed. In case of dissimilar materials used for the duct and the dampers, proper gaskets have to be provided to prevent galvanic action.

Earth Bonding of Ducts. The structure of the platform provides a common earth point for various types of electrical and instrumentation power. From the point of view of safety, ducting should be earthed. All flanged duct joints shall be bonded with double earthing with insulated yellow/green loops with lugs at either end and bolted to the flanges, in visible, preferably diametrically opposite corners of the ducting.

Duct Hangers and Supports. Practice followed for onshore installations can be used, with care taken for anticorrosion treatment complying with the painting specifications of the project. Additional care shall be taken to restrict the lateral movement of ducts over supports (by providing cleats welded on to the supports etc.) as the platform will need shifting from the onshore yard to the offshore location by barge. This transportation and installation will require craneage and hence undue stresses should not be effected on any of the components of the installation.

Air Outlets. Practice followed for onshore installations can be followed, for sizing the outlets. Even though Aluminium is generally not favoured in offshore installations, powder coated aluminium products are nowadays accepted for light duty applications. For heavyduty applications such as in switchgear rooms, battery rooms etc. and in the case of floor grilles over sub floors, stainless steel is the material of construction generally specified. Air outlets in battery rooms and the like, where corrosion is a factor to be considered more than in living rooms, shall be of stainless steel.

Supply air and Return air Outlets for Technical Rooms. For technical rooms, where provision of false floor is generally available, (mainly due to the requirement of laying and managing a very large number of cables) it is preferable to supply air into the space below the false floor which will act as a plenum. Floor grilles can be provided on this floor. Part of the supply air can be permitted to rise to the space through the switch gear and control panels in these technical rooms. Return air can be collected by means of diffusers in the false ceiling. This system has the advantage of more uniform distribution, besides the added benefit of avoiding chances of any condensation droplets falling on the switchgear and control panels.

This is a very important factor, as the relative humidity in the surrounding areas of the platform will be generally very high and there are chances for such condensation droplets, as the heat emitted out from the switchgear panels can vary through a large band. The supply air flow rate is naturally derived by considering total equipment load at peak conditions. Generally the manufacturers of the switchgear will be reluctant to commit any diversity factor and the HVAC engineer plays it safe by considering no diversity, resulting in excess air supply most of the time. Hence prevention of condensation droplets is a very important advantage gained by using supply air distribution through false floors.

Duct Insulation. All ductwork handling treated air, including return air, should be properly insulated and vapour barrier treatment provided. Insulation materials shall be non-hygroscopic. Fiberglass blankets or rigid boards are not preferred, as they are hygroscopic. Mineral wool is preferred. Isocynurates or polyurethane materials are not permitted, due to toxic gases they can generate in the event of a fire.

Aluminium foil backup over the insulation as a vapour barrier, is not adequate for an offshore installation, due to the fact that achieving a successful vapour barrier is dependent on manual labour due to aluminium tape overlapping. There will also be a time gap between the day the insulation is carried out and the day, the plant is commissioned. During this time interval, there could be temperature variations resulting in peeling off of the tapes and entrapping of air within the insulation. Further, installation activities such as cable pulling etc. can damage the aluminium tape vapour barrier. Hence, an additional vapour barrier treatment by using 6 ounce (minimum) canvass or glass cloth coated with asbestosfree vapour barrier products, similar to the well known Foster compound 30:80 is essential. In addition, insulated ducts exposed to outside conditions shall be applied with two coats of tough flexible fire resistive elastomeric finish similar to the well-known Foster Monolar coating 60:95 and 60:96. Many consultants insist that the first coat of this product shall be with 60:95, white colour and the second coating shall be with 60:96, gray colour. This is to ensure application of two coats.

In addition to the above treatment, ducts exposed to view and installed external to the building module shall be clad with stainless steel sheets preferably of minimum thickness 0.5 mm, to provide mechanical protection against damage or misuse.

Provision of such treatment is well justified, though there will be a cost impact, as any slackness on quality vapour barrier treatment could result in costly and time consuming replacement of insulation as well as replacement of products of other services, such as explosion proof light fittings, in case any damage is proved due to the moisture falling from ducts. Since a very costly oil production process is involved, every agency will be very alert about reasons and fixing responsibility, in case a mishap or shut down of the plant occurs. Hence every agency has to be very careful in not compromising on the quality of work.

Identification of Ducts. It is imperative that all ducts be identified after insulation, cladding and installation, using an accepted colour coding system, in line with the fabrication standard followed, showing clearly the air flow direction for each duct in all visible locations, for ease of maintenance.

Duct Penetrations in Fire Rated Walls/Decks

Wherever any duct crosses a fire rated wall or deck, fire dampers are required to be provided. Fire dampers constitute a major component of the safety system on any offshore installation along with other systems such as deluge system, sprinklers etc. Since fire dampers come under the scope of HVAC discipline, the HVAC engineer will be responsible for this portion of the safety system.

As fire dampers have to be operated under the dictates of the Fire and Gas system as well as control system of the platform, the usual "curtain" type fire dampers will not meet with the requirements. The dampers have to be preferably of pneumatic type as instrument quality air will be generally available on platforms. Further, electric actuation will be costlier, due to the zone-rating requirement of any electric component. All fire dampers shall have limit switches or at least proximity switches to enable monitoring of the status of the fire dampers on Fire and Gas control panel – the status of all fire dampers may not be required to be monitored, generally a large number of fire dampers installed in more critical locations will require monitoring. The construction of these dampers shall be generally as per BP Group Recommended Practices and Specifications for Engineering Doc. No. GS 114 -1 or equivalent, which specifies the leakage rate, construction details, accessories required etc.

Within the framework of adhering to the specifications, one can still try to reduce the cost, by reducing the number of fire dampers by providing fire rated ducts. There will be some locations, where the same duct crosses two fire rated walls within a short distance, without any branch take off. In such locations, a fire damper need be provided only in one location with a fire rated duct extending up to the next fire rated wall. Fabrication of fire rated ducts and providing fire rated insulation will work out to be cheaper than providing a fire damper and associated cabling, instrument tubing and ancillary works.

SOLAS permits installation of fire rated sleeves in lieu of fire dampers, if the sectional area is less than $0.075m^2$. This can help the HVAC engineer to reduce the number of fire dampers to effect savings. However, provision of such sleeves may not be possible at times due to other factors such as space available for long fire rated sleeves. This will need detailed study before committing either way.

Whether one has to go for a fire damper or a fire and gas damper will depend on the location of the installation. In most of the cases, fire dampers will do, as HVAC installations will not generally have to be provided where there is gas handling.

Needless to say, the construction of fire dampers shall meet with the fire-rating requirement, using materials that can meet the duty and certification requirements. It will be cheaper to go for stainless steel dampers than even MS galvanized dampers, as galvanizing cannot be done easily after fabrication and assembly of fire dampers. Well known manufacturers in this field are reluctant to take up fabrication of fire dampers with materials other than stainless steel.

All fire dampers shall have frangible bulbs which can be easily replaced through the control box without having to open up the dampers. Fusible linkages are not used, as the same cannot be replaced easily through an access door, unless the access door is very large.

All fire dampers shall have a test button or plug in the control box, with which the operation of the dampers can be easily tested. A schematic diagram for a damper complying with BP recommended practice is shown in **Figure 2**.

Solenoid valves provided inside the control box for operation of the dampers under the dictates of the safety system and HVAC controls shall be generally with 24 V coils, and essentially in a flameproof enclosure.

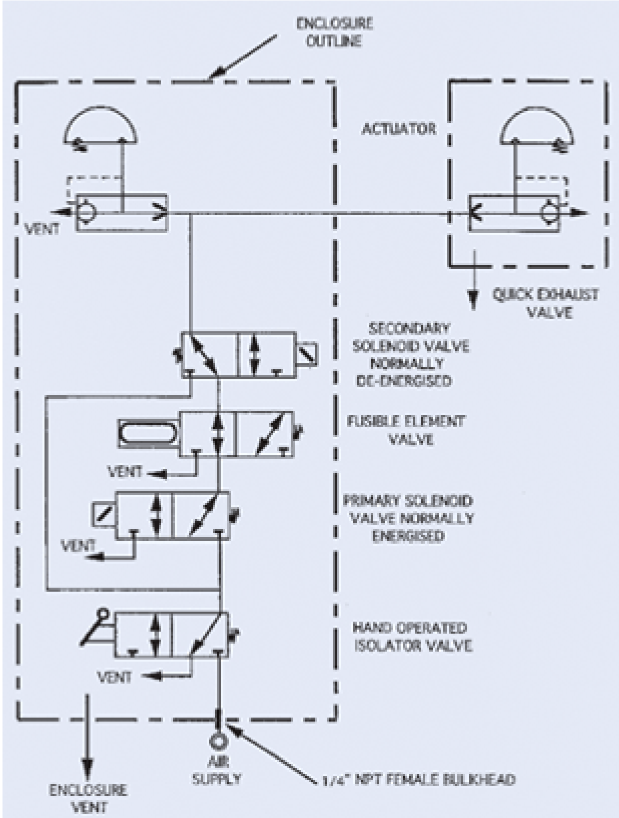

Figure 2 : Control and pneumatic diagram for a damper.

Water Piping

There is nothing special in the practice followed, except for carrying out radiography tests on welded joints with a view to reduce chances of failures or leakages later after commissioning and anti-corrosive treatment adhering to painting specifications of the project, with materials of construction suitable for marine applications. For chilled water circulation, MS heavy-duty seamless pipes are used. For sea water, either cupronickel 90:10 or GRP pipes shall be used. Insulation for chilled water piping shall be carried out with pipe sections of mineral wool, with proper vapour barrier treatment for which the comments made above for duct insulation, will apply after adapting the same for piping.

Wherever any piping penetrates any fire rated wall or deck, these penetrations have to be filled with gas/ smoke tight and fireproof plugs to maintain fire integrity (similar to the application of fire dampers in the case of ducting). Recommended material – CSD plugs, by CSD Sealing Systems of Netherlands. (CSD stands for Conduit Sleeve/Drilled hole sealing systems).

Electrical Installation

What distinguishes electrical installations for offshore HVAC systems from normal onshore installations are basically the wiring specifications for hazardous area equipment wherever it is relevant. The specifications that are followed onshore for hazardous area applications like refineries can be followed here too.

Cables. Fire retardant and fire resistant cables shall be used as specified in the project specifications. All cables shall be halogen free. All cables shall be properly identified as per the cable schedule, with tag numbers as per the project specifications. Wherever the cables cross fire rated walls/ decks, multicable transits shall be used, with identification tags for cables on either side of such transits. Colour coding shall be adhered to, strictly, with a view to reduce down time for any maintenance activity. Power and instrument cables shall be laid in separate cable trays keeping a specified distance of a minimum of 450 mm to prevent chances of fault and nuisance signals disrupting operation of the systems. Clash checking shall be conducted during preparation of drawings keeping this point in view.

Cable Glands. Cable glands shall be suitably rated matching with the cables for which the glands are intended to be used. (Explosion proof and fire rating)

Cable Penetrations. Whenever any cable crosses a fire rated wall or deck, MCTs (multiple cable transits) shall be provided to maintain the integrity of the wall/ deck being penetrated. While designing the transits, care should be taken to provide a minimum of 25% spare blocks for each size of block, to take care of future modifications or upgrading. Further, spare blocks shall have to be kept in the stores too for easy availability.

Earthing. Double earthing shall be provided for each electrical equipment, with earthing wire size to comply with the latest revisions of International Electrotechnical Commission. Power and instrumentation earthings (both clean and unclean) have to be separate.

Installation of Control Panels. While switch gear and control panels are usually installed in pressurized rooms, there may be cases where some control panels, such as that of chillers cannot be installed in pressurized rooms. In such cases, the control panels can be made 'safe' by using purged and pressurized enclosures for such panels. (Ref: NFPA 496 Standards for purged and pressurized enclosures). Adequate safe guards shall have to be provided in such cases.

Procedures for Installation, Precommissioning and Commissioning

Documents detailing the procedures for installation, precommissioning and commissioning are to be prepared and got approved, with the following in view:

- To ensure that the installation is carried out as per the specification and complying with good engineering practice.
- To ensure proper co-ordination with various specialist agencies working on the platform simultaneously.
- To ensure proper documentation on all aspects of the installation for reference at a later date, to achieve minimum down time in case of any breakdown in future, as production losses will be very high in such cases
- To ensure a safe working environment.

(In onshore installations, though the above factors are relevant, the costs associated with the activities do not compare in such a high proportion to the production costs, as in an offshore field, resulting in not getting as much priority for such documentation)

As-Built Drawings and Documentation

This is very important aspect of any offshore installation, as final payment will not be settled till 'as built' documentation is completed to the entire satisfaction of the client and user. Since operating personnel keep changing offshore due to socio-economic factors, one has to ensure that it takes the least time, even for a new comer to the platform for maintenance and operation, to get familiarized with the installation. Another important factor is, as mentioned earlier in this writeup, the knock on effect on the operations and the cost involved in case of a plant shut down.

Conclusions

As mentioned in the introduction, the objective of this article is to highlight the features that distinguish an offshore installation from a standard installation onshore. This article by itself cannot be considered as a reference point. Relevant codes and standards will need following in detail, while undertaking an offshore installation. As mentioned in the beginning of this article, the prime and foremost consideration for any offshore installation is safety. Every action while undertaking an installation offshore shall be audited keeping this factor in mind. If adequate attention has been able to be drawn to this aspect, the objective of this article will have been served.