



THE PROOF IS IN THE ROOF

Roofing and waterproofing are important aspects of a home and must have the right materials and technology to make homes leakproof and weather-proof.

BY BINDU GOPAL RAO

As an alternative to asbestos roofing systems, screw down metal roof systems has been extensively used in the industrial and warehousing roofing in India. Trapezoidal roofing sheets are manufactured on state-of-the-art cold roll forming lines in transportable lengths as per the design. Sheets are fixed on to roof structure by specially designed self-tapping screws with aluminium washers, and all the longitudinal and side joints are sealed using silicon sealants and butyl tapes for ensuring a leak proof performance. In this system there is a penetration of roof surface and therefore high quality workmanship and roof maintenance are critical to having leak proof roof. **PK Nagarajan, CEO, Tiger Steel Engineering (India)**, explains, "As

an advancement, we have introduced standing seam metal roof systems that completely eliminates penetration of roof surface. Portable roll forming lines housed in a container are transported to the site along with required raw materials. Since the roofing sheets are produced at site, it can be in one single length from ridge to eaves, without worrying about the transportation constraints. This eliminates the longitudinal joints and avoids use of conventional sealing materials making the roof less vulnerable to leakages that arise due to deterioration caused to sealants. Another interesting technological feature of this roof system is held by secret clips that are fixed on the steel structure, the roof panel side laps are rolled over the Clips and seamed in to 360° double lock by with zinc coating of 180 motorised seaming

machine. The floating clips are designed for the thermal movements of roof sheets and double lock side laps along with secret clips provide secure structural performance against wind uplifts besides providing leak proof roofing system."

This is surely one of the significant technological advancements suited to countries like India that experience heavy monsoons in most parts of the countries for about 3-4 months every year. Globally the non-asbestos corrugated roofing sheets are manufactured by using humid cure technology with high quantity cement which results in high density and heavier sheet weight. "HIL has developed breakthrough technology of non-asbestos corrugated roofing sheets by employing auto-clave method with lesser quantity of cement which results in low density and light weight sheets. The product manufactured by this method has low drying shrinkage feature as compared to humid cure non-asbestos and asbestos fibre cement sheets and hence superior performance and durability is expected when stored," says **Dhirup Roy Choudhary, CEO & MD at HIL Limited (CK Birla Group)**.

MATERIAL ADVANTAGE

In conventional non-asbestos roofing sheets, raw material used are cement, limestone, micro silica, and bentonite as binders and polyvinyl alcohol, polypropylene and wood pulp

are used as reinforcement. Popularly used roofing materials in metal roofing can be classified into colour and non-colour roof panels. On the upper end of the scale both colour and non-aluminum roofing panels are used in trapezoidal roof panels as well as standing seam panels. "Aluminium roofing panels are considered superior due its resistance to corrosion, better heat insulation properties, lighter in weight besides realisation of better resale value at the end of its life. Coating of zinc on metal is a traditional material used for a very long time in India. Examples can be seen in the older industrial buildings as corru-



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▲ R&D of chemicals plays an important role in acquiring the right waterproofing.



▲ The right sealant plays an important role in leak-proofing roofs.



▲ Workers concoct the right mix for waterproofing.

gated GI sheets. Earlier the sheets had zinc coating of 120GSM, and yield strength of 250MPA. In order to improve the performance, materials with zinc coating of 180GSM to 275GSM, yield strengths of 345MPA are now being used to provide superior structural performance and resistance to corrosion," adds Nagarajan. Specialised coating of aluminium and zinc commonly called as galvalume have become popular in India as it combines the good corrosion resistance properties of aluminium and zinc giving users a viable alternative from the cost and performance perspective.

Likewise, COLORBOND steel is one of world's most advanced and trusted pre-painted steel product for the building and construction industry that offers design flexibility and superior aesthetics to the overall structure; going beyond performance. Some of its variants are specially developed for the Industrial and coastal environments. ZINCALUME steel the substrate for COLORBOND steel ensures superior abil-



“THE ROOF IS HELD BY SECRET CLIPS FIXED ON THE STRUCTURE, AND SEAMED IN TO 3600

DOUBLE LOCK WITH ZINC COATING OF 180 MOTORISED SEAMING.”

PK NAGARAJAN

ity to resist corrosion up to four times longer than galvanised steel of equivalent coating thickness. COLORBOND steel is not simply painted, but has a paint system that delivers longer life and superior aesthetics. "The unique composition of the paint system consists of stable resins and inorganic pigments that do not break down easily even under severe UV radiation, thus preventing fading and chalking for longer. Also the coating technology is formulated to resist cracking and peeling during roll forming and usage. The colours too are developed in consultation with world's leading colour consultants and building professionals. One of its technological breakthroughs has been THERMATECH technology that reflects sun's heat to help roofs stay cooler thus reducing the inside temperature and overall energy consumption," says Mahendra Pingle, deputy GM, market development, Tata BlueScope Steel.

NEW VISTAS

The model of working with developers is primarily dependent on the nature of the project. "On one end of the spectrum, we only provide materials to a project based on the requirements raised by the developer, whereas on the other side we also engage with the builder in designing the waterproofing systems and suggest the most suitable waterproofing system as per the project requirement. In some cases, we also execute the installation, application and audit of the waterproofing system and provide end to end guarantee to the developer," says Bahadur. Nakhul Jagannath, co-founder, Aqua Seal Waterproofing Solutions, adds, "Every developer has different needs and requirements. We at Aquaseal have detailed discussions around what the project needs, what is the risk taking capacity of the developer, post which we come

up with alternative methods that the project could use. We also understand that there is no one fixed methodology that would suit a single project. We flex our initial plan based on the needs on an ongoing basis. In the past, we have also used multiple methods on a single project, thereby giving the end user a good solid waterproofed structure."

Rajeev Jain, director, Nirmal, adds, "We have different coatings as per different projects. We use hydromax foundation waterproofing, drainage mat system, value insulation waterproofing, self-adhering sheet membrane, bentonite geo textile system, moisture remediation epoxy coatings, hybrid polyurethane coating and crystalline water proofing. These waterproofing are separate in terms of materials used and process used for them."

GOING GREEN

HIL developed non-asbestos roofing sheets branded Charminar Fortune as eco-friendly because no hazardous materials are used in the product, no waste is generated, byproducts of other industry like fly ash generated from thermal power plants, and cotton rag waste are consumed for manufacturing the product. About 80% of these raw materials are sourced from less than <150 kms, is 100% re-usable, and has no negative social impact. The main objective of a sustainable roofing

material is to reduce or completely avoid, depletion of critical resources like energy, water and raw materials; preventing environmental degradation and creating a built environment that is liveable, comfortable, safe, and productive. "THERMATECH technology reduces the amount of heat transferred inside the building, which results in better thermal performance and cooler comfort. In hot weather, COLORBOND steel can reduce peak roof temperature up to 6°C. It can also reduce annual cooling energy consumption by up to 15% depending on the level of insulation, colour, building shape, orientation and function," adds Pingle.

Tata BlueScope Steel is working towards creating sustainable and innovative building materials and products that will help reduce adverse impact on the environment. The thermal conductivity of the products is 0.167 W/mk against colour coated metal sheets 46w/mk hence the thermal insulation performance is expected to be superior than colour coated sheets. "Since the sheet weight is relatively low, the freight cost per sheet is also low. Lower sheet weight also helps in bringing down the overall structure cost compared to other alternatives. Thus it proves to be very beneficial on all accounts. The innovated products is light weight and high strength and meets performance requirement of national and international standards like IS 14871, EN 494 and ISO 9933," says Choudhary.



▲ Fixing a roof requires expertise and should be maintenance-free.



▲ Roofing tiles come in myriad shapes and materials and users would best be advised by architects.



▲ (L-R) Nakhul Jagannath, co-founder, and Manish Bhavnani, proprietor, Aqua Seal Waterproofing Solutions.

PRODUCT MIX

Likewise the market has several coatings for waterproofing. Pidilite Industries has the largest range of coatings in the Indian waterproofing industry from the Dr Fixit's stable. "We provide cementitious, acrylic, bituminous, polyuria and other hybrid coatings. These coatings have myriad applications based on the surfaces that they are applied to. As the range of the products in our portfolio is fairly wide, it would be difficult to comment on how distinct these products are; as one product used for a particular surface will not be relevant to a different surface," says **Dr Sanjay Bahadur, global CEO, construction chemical division, Pidilite Industries**. The distinctiveness of the product is based on several parameters such as performance expectation, life, elongation and the overall durability and sustenance of the product at large. Aquaseal Waterproofing uses different waterproofing coating systems such as acrylic, crystalline, polyurethane based systems. Each of these coating systems has its own unique properties. Acrylic coating systems are of two types: A two

component acrylic coating system (2K) and crystalline coating systems. "A two component acrylic coating system (2K) is one which is mixed along with a polymer modified powder and is used predominantly in waterproofing of wet areas such as bathrooms, utility etc. These coatings are flexible in nature but cannot be left exposed to sunlight. On the other hand, a single component acrylic coating system (1K) possesses more or less the same flexibility and strength but can be left exposed to sunlight," says **Manish Bhavnani, proprietor, Aqua Seal Waterproofing Solutions**. Crystalline coating systems are active systems i.e. their nature of developing insoluble crystals in a concrete structure is through the life of the concrete. This system acts as a catalyst in the concrete member to initiate the growth of crystals so as to stop the entry of water the minute the structure is exposed to water. This system gets stronger in the presence of water which is ideal to treat tricky leaks. Polyurethane based coating systems possess high flexibility and strength having elongation of about 250-1000%. These systems are ideal for large span of areas such as terraces, podiums, etc. They form a seamless coat without having any joints. Innovations in water proofing are also being seen in the market. In the last one year, Pidilite has introduced two revolutionary products in the raincoat range being "Raincoat Select" and "Raincoat Waterproofing Coat" which are specifically used for waterproofing exterior surfaces. "Along with us, specifically for roofs, we have introduced "Dr. Fixit Raahat" which is essentially a waterproofing + insulation solution, which can be used in slums and industrial buildings, as it acts as a technologically superior and long-lasting product; when compared to aluminum sheets. These products have a strong proposition and we are certain that they will have a way forward; due to the benefits associated with them," says Bahadur. **CW**