

# Corrugated Plates & Culverts, Pipes for Silos & Steel Structures

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In this Twentyninth series of articles on Rollforming we will discuss about corrugated rollformed plates, culverts, pipes and steel structures which are used in the area of infrastructure and transportation. It is a well known fact that corrugation given to a plain sheet increases its strength many folds. The idea of converting the corrugated sheets into pipes and culverts is a fairly new concept. We are mostly used to plain pipes and curvatures of plain sheets.

Corrugated steel plates are being used in the advanced countries as a most effective alternative to reinforced concrete for many different civil engineering works. The high deformability of corrugated steel structures allows it to absorb seismic shocks and general soil settlements better. The corrugated steel structures are suitable for any kind of application and in any environmental condition. They could also be used for temporary works and the material components could be recovered and reused again.

Culverts are the traditional applications for corrugated steel plates in constructions in the advanced countries. They could be used for spans upto 12 meters. The thickness of the plates used could go upto 19mm.. Specially shaped culverts can be designed to meet any need, find different uses in every construction sector like road and mine sector, for underpasses, surface tunnels, formworks and structures to reduce the embankment and cover load. They are used in environmental protection works and hydraulic engineering e.g. culverts used as water channels, road drains, draining pipes, irrigation channels, underground or open storm water tanks. They are used in the environmental engineering area for liquid treatment tanks of purification systems, dumping grounds and drainage works.

Another fast catching up area for the usage of curved corrugated sections is grain storage silos. Here the sections are rollformed to special corrugated shapes, holes

prepierced and cut to lengths. Later the sections are given the required radius on 3or4 roll bending machines (as shown in Fig.9b). Finally they are bolted to each other to form silos. These plates are easy to store and handle and thus simplifies the transport operations with any means of transport.

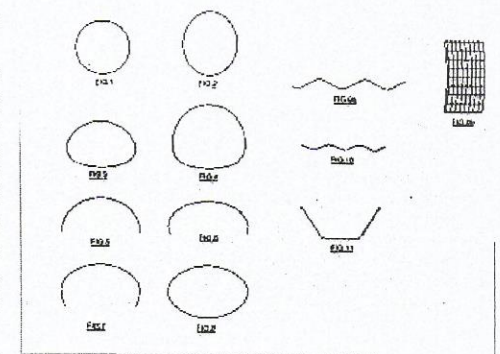
The corrugated ( magnified cross section portion is shown in Fig 9a & Fig 10) steel culverts are formed into circular ( Fig.1 sections and elliptical sections ( Fig.2&8 ) and they are suitable for hydraulic applications as they allow bearing high loads. High Profile pipe arches ( Fig 3 ) are particularly suitable when the rise ( the vertical dimension of the structure ) has to be kept as low as possible. Underpasses ( Fig 4 ) used for tunnels, when it is necessary to have a rise that can meet the transit needs of both motor vehicles/or people. Arch and " big span " section ( Fig5,6 & 7 ) used to cover channels and as a reinforcement of pre-existing works, or for wide dimension applications .Fig. 11 shows another variation the cross section of water channels used.

The corrugated steel pipes which is the latest development in the area of transportation and Infrastructure. The magnified portion of cross section is shown in Fig. 9a and Fig. 10. In India they are now hardly being used. Bending the corrugated sheet into a pipe form gives an enormously higher strength pipe and there is a huge material saving. The corrugated steel pipes could be made available in various shapes and sizes to meet the drainage, sewer and transportation needs.

The diameter could vary from 150 mm to 8 metre and it still go to bigger diameters. The thickness can vary from 2 mm to 19 mm. For higher thicknesses heavy duty rollforming machines are used. To increase the life of the corrugated pipes they could be hot dip galvanized, coated with aluminium, epoxy or bituminous coated, polymer coated or high strength concrete lined. In the Advanced countries most of the drainage, sewage and highway construction pipes are

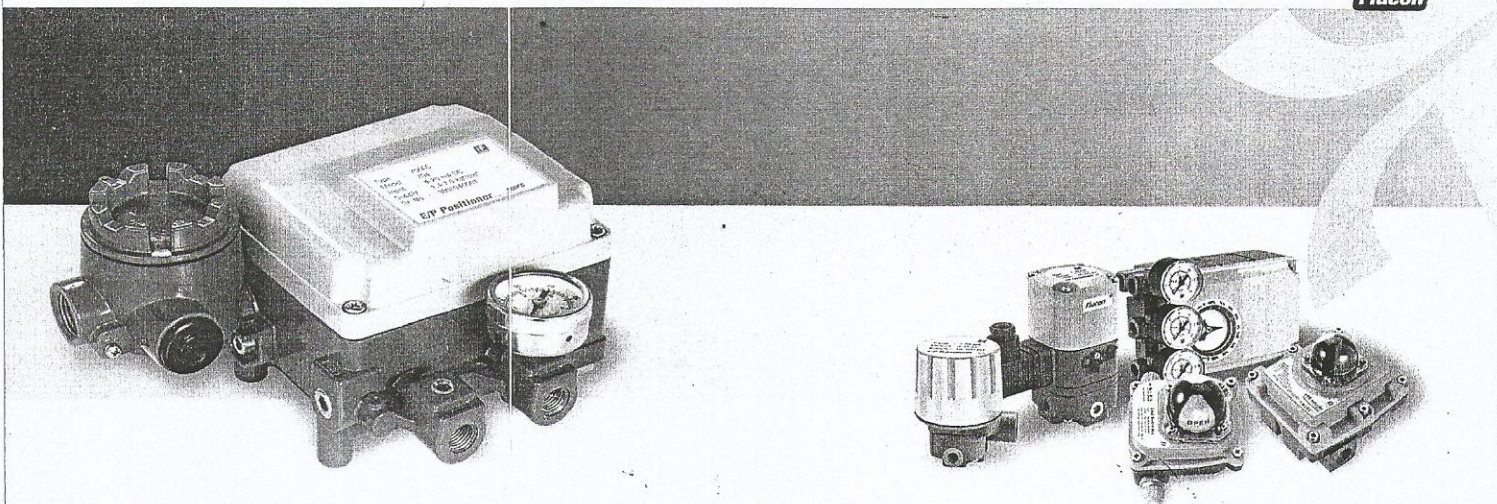
coated with protective layers.

Other variations of corrugated pipes having lesser thicknesses are provided with helical lock seams or rivetted. Helical lock seam corrugated pipes are made in the diameter



range of 150mm to 3300 mm. Whereas rivetted corrugated pipes are made in the diameter range of 300mm to 1500mm.. Compared to heavier rigid pipes their weights are about one-tenth. The light weight pipe makes handling, installation, loading and unloading easy for the end user. Because they are galvanized/aluminized/polymer coated they are long lasting and are the most economical choice for the drainage needs. A new coated steel pipe product which has been recently developed using 0.7mm thick galvanized sheet laminated with a polymer protective film offers an innovative solution for culvert construction. They are made of polymer coated ribbed steel profile that is lightweight but strong and easy to install. From the above one could visualize the direction of the development going using lightweight, strong and durable corrugated curved steel plates and pipes in the area of infrastructure and transportation in the years to come all over the world.

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