

DN 200 SCH. 40 CARBON STEEL VERSUS STEEL MESH ARMOURCORE

Scope: Comparative cost estimate for use of Sch 40 Carbon Steel piping versus Steel Mesh ArmourCore for site Installation of 100m of DN200 process plant piping in a piperack with 6 elbows and 2 ANSI #150 flanges.
 - Allow 6 welded elbows (ie 2 welds each) + 1 weld per 12m length of pipe (ie 9 welds) = 21 welded connections (excluding flanges), Assume 10 pipe joints need to be cut to length

Assumptions: For the purposes of this comparative estimate, ignore cost of transport to and from site, craneage, scaffolding, hydrotest, pipe supports [6m centes for both CS & ArmourCore], bolt-up, consumables, NDT, equipment hire etc. Note that in the case of many of these cost parameters ArmourCore would be less expensive (ie smaller craneage, no electrodes/paint/blasting consumables, substantially lower equipment hire costs [generators, blasting equipment, welders etc], no requirement for NDT of weld etc)

Use carbon steel piping labour rates form Page & Nations Estimators Piping Man Hour manual (published by Gulf Publishing Company) and assume a laour productivity of 1.4 x Gulf of Mexico standard rates. For ArmourCore use a handling & erection labour rate as a mean of the Gulf rate for sch 40 CS and PVC multiplied by a productivity of 1.4. For other ArmourCore labour rates use conservative allowances.

A steel mesh reinforced ArmourCore product is allowed for with a design pressure of 1600 kPag, OD of 200mm and wall thickness of 10mm.

Item	Activity Description	Unit	Quantity	Weight (kg)		Unit Man-hours	Total Man-hours	Unit Labour Cost	Unit Material Cost	Total Cost		
				Unit	Total					Labour	Material	Total
Sch 40 Carbon Steel												
1	DN200, Sch 40 - Handling & Erecting	lin. m	100	42.6	4,260	1.57	157.1	\$ 100	\$ 103	\$ 15,708	\$ 10,300	\$ 26,008
2	DN200, Sch 40 - Flame Cutting	ea	10			0.64	6.4	\$ 100		\$ 644	\$ -	\$ 644
3	DN200, Sch 40 - Flame Beveling	ea	20			0.52	10.4	\$ 100		\$ 1,036	\$ -	\$ 1,036
4	DN200, Sch 40 - Straight Run Manual Butt Welds	ea	9			3.64	32.8	\$ 100		\$ 3,276	\$ -	\$ 3,276
5	DN200, Sch 40 - 90 Degree Welded Elbow Butt Welds	ea	12	20.9	251	3.64	43.7	\$ 100	\$ 75	\$ 4,368	\$ 900	\$ 5,268
6	DN200, Sch 40 - Attach Slip On #150 Flange	ea	2	15.0	30	7.14	14.3	\$ 100	\$ 60	\$ 1,428	\$ 120	\$ 1,548
7	DN200, Sch 40 - Blast & Paint	lin. m	100			0.60	60.1	\$ 100		\$ 6,006	\$ -	\$ 6,006
TOTALS					4,541		325			\$ 32,466	\$ 11,320	\$ 43,786
Steel Mesh ArmourCore												
1	DN200, ArmourCore - Handling & Erecting	lin. m	100	8.0	800	1.11	111.0	\$ 100	\$ 57	\$ 11,100	\$ 5,700	\$ 16,800
2	DN200, ArmourCore - Drop Saw Cutting to Length & Deburr	ea	10			0.25	2.5	\$ 100		\$ 250	\$ -	\$ 250
3	DN200, ArmourCore - Prepare Straight Run Pipe for EF Weld	ea	21			0.50	10.5	\$ 100		\$ 1,050	\$ -	\$ 1,050
4	DN200, ArmourCore - Prepare Steel Mesh Elbow for EF weld	ea	12	4	48	0.50	6.0	\$ 100	\$ 103	\$ 600	\$ 1,236	\$ 1,836
5	DN200, ArmourCore - Prepare Stub Fange for EF Weld	ea	2	4.3	9	0.50	1.0	\$ 100	\$ 210	\$ 100	\$ 420	\$ 520
6	DN200, HDPE - Install Electrofusion Coupling	ea	23	5	115	0.50	11.5	\$ 100	\$ 54	\$ 1,150	\$ 1,242	\$ 2,392
TOTALS					972		143			\$ 14,250	\$ 8,598	\$ 22,848

Relative installed cost of ArmourCore compared with Sch40 piping for this example

52%

Conclusion: ArmourCore is less expensive in terms of both labour and materials and if the conservative assumptons above are reviewed in detail then substancial additional capital cost benefits will result from the likes of savings in consumables, equipment hire and supervision requirements.

Other Considerations: **Opex:** Over a 50 year operating life, ArmourCore will be expected to have a much reduced opex compared with carbon steel piping because of zero protective coating requirements, reduced scaling and reduced wear due to abrasion. The excellent thermal insulation characteristics of ArmourCore compared with carbon steel may also have beneficial opex impacts in terms of conservation of process heat.

