USE OF PREFABRICATED REINFORCEMENT

Advantages

To improve buildability, the use of prefabricated reinforcement should be considered in situations where the use of precast concrete is not feasible. Time for reinforcement laying and site labour can be reduced considerably with the use of prefabricated reinforcement. Prefabrication under well-controlled factory conditions also ensures better quality in dimensional accuracies.

Prefabricated reinforcement includes welded wire fabric, prefabricated link cages and prefabricated full cages (links and main bars). The Housing and Development Board (HDB) uses welded wire fabric and prefabricated link cages extensively in their projects. Many commercial projects use partial or full prefabricated cages to speed up reinforcement placement. Designers should approach steel reinforcement suppliers for catalogues on use of prefabricated reinforcement.

Welded Wire Fabric

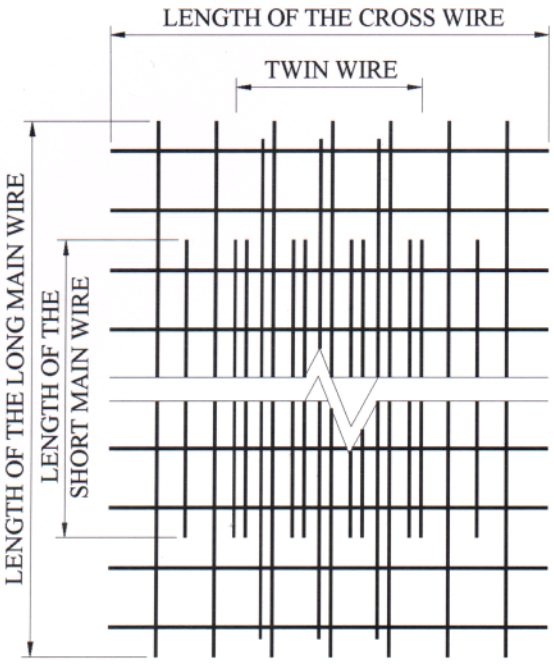
So far, only plain bars have been used in welded wire fabric (WWF) in Singapore. The plain bars, produced according to Singapore Standard 18, are welded together to form WWF according to the specifications in Singapore Standard 32. Recent developments points to the increasing use of deformed bars in WWF, particularly in Germany. In the near future, welded wire fabric using deformed bars are expected to be produced in Singapore, once the Singapore Standard 18 has been revised to include the relevant specifications. Table A,B and C are design aids on the use of WWF. Variations of WWF include :

Double Wire Fabric

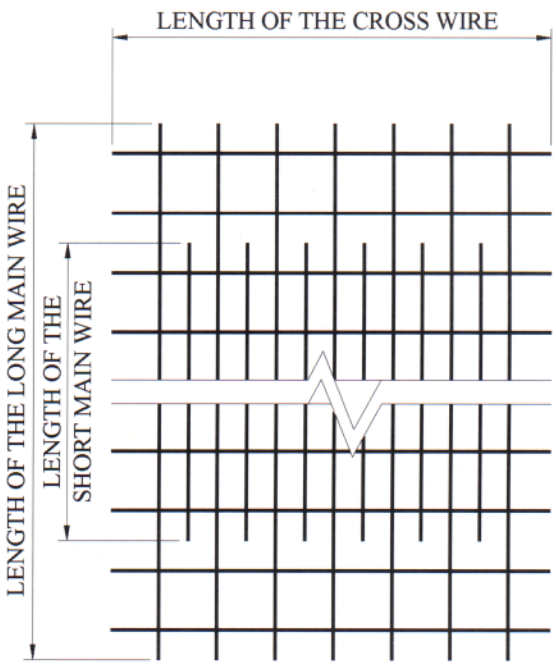
For slab areas where heavy reinforcement are required, double wire fabric may be specified. Two wires are arranged together to form a single main line at regular spacings of 100mm, 150mm or 200mm.

Staggered Fabric

Where there is curtailment of bars, staggered fabric may be specified. Typical use of staggered fabric can be seen in structural slabs as top reinforcement spanning across a beam.

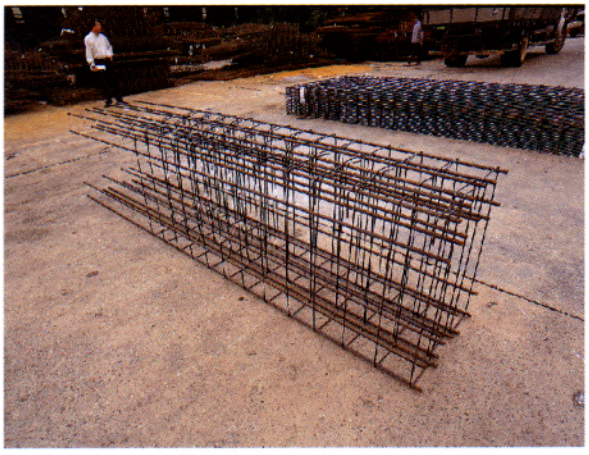


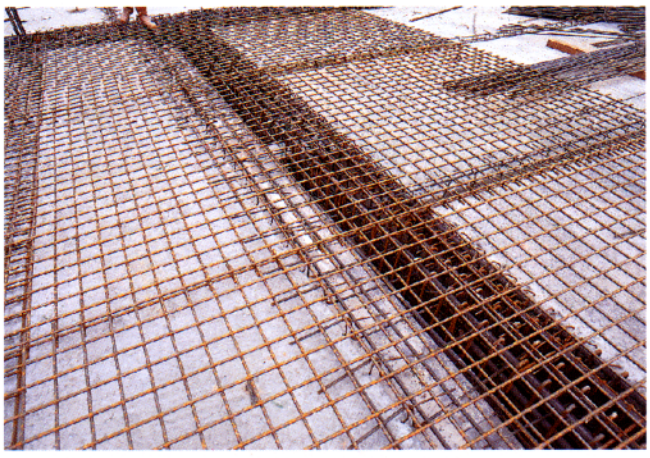
DOUBLE WIRE FABRIC



STAGGERED FABRIC

Prefabricated Re Cages

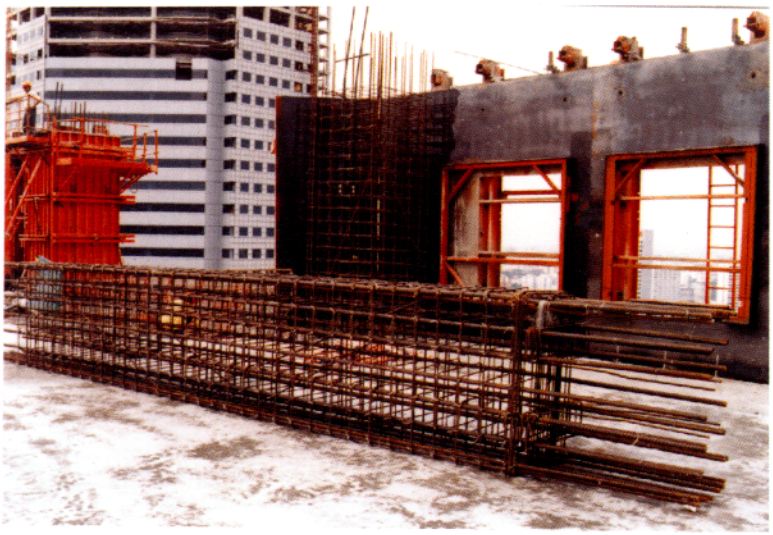




Designers should take note of the following production limitations:

	Minimum Width (mm)	Maximum Depth (mm)
Beam Cages	150	2000
Column Cages	90	1500
Standard Link Spacing (mm)	75,100,125,150, 200, 250, 300	

nforcement



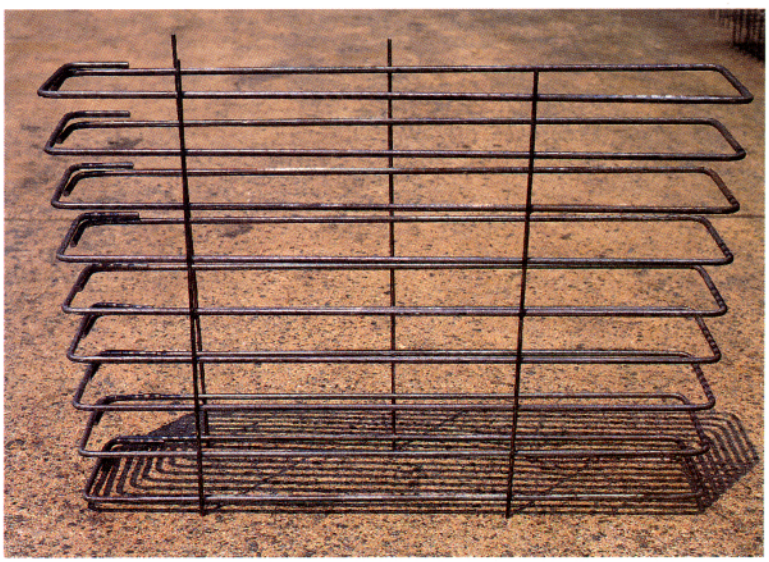


TABLE A SPECIFICATION FOR WELDED WIRE FABRIC

STANDARD SPECIFICATIONS - SHEETS

		Main Wire		Cross Wire		Cross Sectional		Area Mass Per
SS32 Ref. No.	BS4483 Ref. No.	Size (mm)	Spacing (mm)	Size (mm)	Spacing (mm)	Main mm^2/m	Cross mm^2/m	Unite Area kg/m^2
SQUARE MESHES								
A 13	-	13	200	13	200	664	664	10.42
A 12	-	12	200	12	200	566	566	8.89
A 11	-	11	200	11	200	475	475	7.46
A 10	A 393	10	200	10	200	393	393	6.16
A 9	-	9	200	9	200	318	318	4.99
A 8	A 252	8	200	8	200	252	252	3.95
A 7	A 193	7	200	7	200	193	193	3.03
A 6	A 142	6	200	6	200	142	142	2.22
A 5	A 98	5	200	5	200	98	98	1.54
D 13	-	13	100	13	100	1327	1327	20.83
D 12	-	12	100	12	100	1131	1131	17.76
D 11	-	11	100	11	100	950	950	14.91
D 10	-	10	100	10	100	785	785	12.32
D 9	-	9	100	9	100	636	636	9.98
D 8	-	8	100	8	100	503	503	7.90
D 7	-	7	100	7	100	385	385	6.04
D 6	-	6	100	6	100	283	283	4.44
D 5	-	5	100	5	100	196	196	3.08
RECTANGULAR MESHES								
B 13	-	13	100	10	200	1327	393	13.50
B 12	B 1131	12	100	8	200	1131	252	10.90
B 11	-	11	100	8	200	950	252	9.43
B 10	B 785	10	100	8	200	785	252	8.14
B 9		9	100	8	200	636	252	6.97
B 8	B 503	8	100	8	200	503	252	5.93
B 8A	-	8	150	7	200	335	193	4.14
B 7	B 385	7	100	7	200	385	193	4.53
B 6	B 283	6	100	7	200	283	193	3.73
B 5	B 196	5	100	7	200	196	193	3.05
STANDARD SPECIFICATIONS - ROLLS (48X2.4m)								
A 6	A 142	6	200	6	200	142	142	2.22
A 5	A 98	5	200	5	200	98	98	1.54

TABLE B SUBSTITUTION OF FABRIC FOR MILD STEEL BARS

BARS			SUBSTITUTION OF FABRIC FOR MILD STEEL BARS		
DIAMETER (mm)	SPACING (mm)	AREA (mm^2/m)	EQUIVALENT AREA (mm^2/m)	RECOMMENDED FABRIC REF NO. (mm^2/m)	
10	75	1047	540	D9 B9 (636)	
	100	786	405	D8 B8 (503)	
	125	628	324	B8A (335)	A10 (393) B7 (385)
	150	524	270	D6 B6 (283)	A9 (318)
	175	449	231	A8 (252)	
	200	393	203	A8 (252)	
	250	314	162	A7 (193)	D5 B5 (196)
	300	262	135	A6 (142)	
13	75	1770	912	D11 B11 (950)	
	100	1327	684	D10 B10 (785)	
	125	1062	547	D9 B9 (636)	
	150	885	456	D8 B8 (503)	
	175	759	391	A10 (393)	
	200	664	342	D7 B7A B7 (385)	
	250	531	274	D6 B6 (283)	A9 (318)
	300	442	228	A7 (193)	

* Equivalent Area $= \dfrac{As \times fy\ (steel\ bar)}{fy\ (fabric)}$

where As = Area of steel bar

fy (steel bar) = 250 N/mm^2 for mild steel bar

fy (fabric) = 485 N/mm^2 for hard-drawn steel wire

TABLE C SUBSTITUTION OF FABRIC FOR HIGH TENSILE STEEL BARS

BARS			SUBSTITUTION OF FABRIC FOR HIGH TENSILE STEEL		
DIAMETER (mm)	SPACING (mm)	AREA (mm^2/m)	EQUIVALENT AREA (mm^2/m)	RECOMMENDED FABRIC REF NO. (mm^2/m)	
10	75	1047	993	D12 B12 (1131)	
	100	785	745	D10 B10 (785)	
	125	628	596	D9 B9 (636)	
	150	524	497	D8 B8 (503)	
	175	449	426	D8 B8 (503)	
	200	393	373	D7 B7 (385)	A10 (393)
	250	314	298	A9 (318)	B8A (335)
	300	262	248	A8 (252)	D6 B6 (283)
13	75	1770	1679	Nil	
	100	1327	1259	D13 B13 (1328)	
	125	1062	1007	D12 B12 (1131)	
	150	885	839	D11 B11 (950)	
	175	759	720	D10 B10 (785)	
	200	664	630	D9 B9 (636)	
	250	531	504	D8 B8 (503)	
	300	442	419	D8 B8 (503)	
16	75	2681	2543	Nil	
	100	2011	1907	Nil	
	125	1609	1526	Nil	
	150	1341	1272	D13 B13 (1328)	
	175	1149	1090	D12 B12 (1131)	
	200	1005	953	D11 B11 (950)	
	250	804	763	D10 B10 (785)	
	300	670	635	D9 B9 (636)	

$$\text{* Equivalent Area} = \frac{\text{As x fy (steel bar)}}{\text{fy (fabric)}}$$

where As = Area of steel bar

fy (steel bar) = 460 N/mm^2 for high tensile bar

fy (fabric) = 485 N/mm^2 for hard-drawn steel wire