

Tabla 1.- Características de la escoria comparada con varios agregados naturales.

TB 1										
1	2	3	4	5	6	7	8	9	10	11
	Origin		loss %	%	%			2 mm		E/L
	exploited in the gallery	12/16	1.4	0.8	22.6	8/16	R ₀ : 37% < 40	P ₁ -18%	8/16	0.324 < 0.390
	open air exploited	12/16	7.3	3.5	62.0	8/16	R ₀ : 40% > 40	P ₁ -19%	8/16	0.452 > 0.390
	Moselle	12/16	1.3	0.4	17.9	8/16	R ₀ : 53% > 40	P ₁ : 15%	8/16	0.432 > 0.390
Conglomerate	Folschette	12/16	1.0	0.3	13.4	8/16	R ₀ : 51% > 40	P ₁ -15.52	8/16	0.448 > 0.390
	Rhin	12/16	0.1	< 0.1	6.2	8/16	R ₀ : 58.9% > 40	P ₁ -9%	8/16	0.478 > 0.390
	Each	12/16	0.05	0.0	0.6	8/16	R ₀ : 44% > 40	P ₁ -17%	8/16	0.466 > 0.390

Freeze thawing test 28 cycles of 1h of freezing at 20°C and 1h of thawing in water at 20°C on samples saturated with water.

Crystallization test with a solution of Na₂SO₄ 15 cycles of 1h in the solution and 1h dried at 105°C

diluted solution saturated solution

Resistance to static compression

Shape index

Tabla 2.- Características mecánicas, físicas y químicas de la escoria triturada y granulada

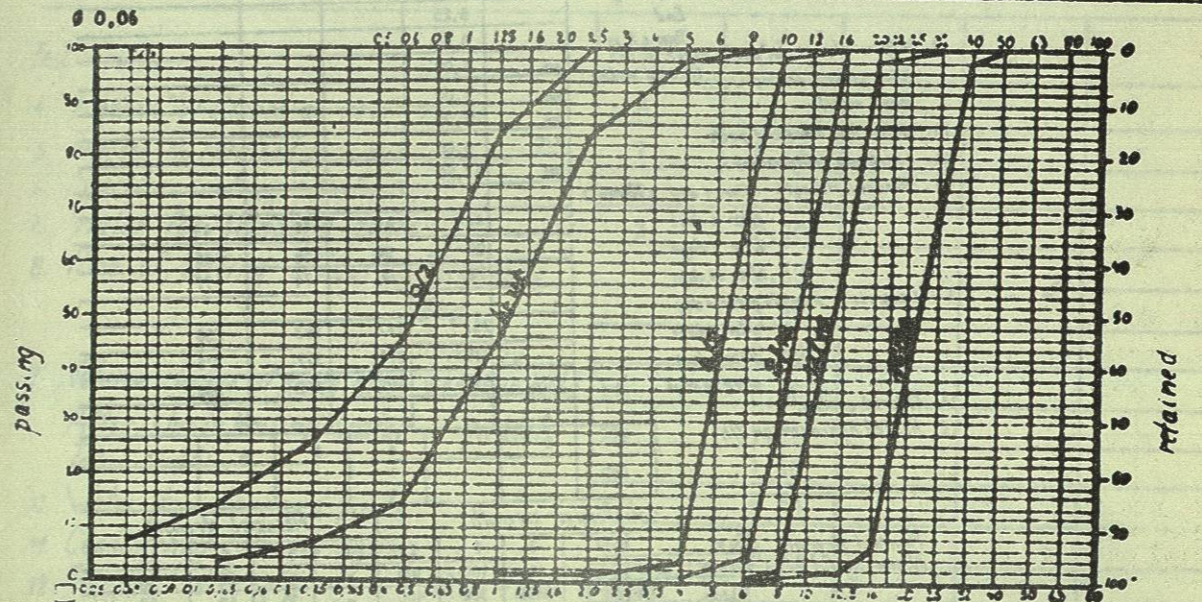
Mineral aggregates

TB2

Analysis

Test specimens of rough crushed slag and precrushed granulated slag and crystallized slag

mm	1.125	0.25	0.50	1	2	4	6.3	8	10	12	16	25	32
CS rough	3	7	15	45	84	98	100						
Sieve analyses 02	14	26	46	84	100								
CS 4/8				1	1	3	75	90	-	100			
CS 8/12						1	5	31	-	100			
CS 12/16							1	2	-	59	98	100	
CS 16/32							1	1	-	2	6	70	98



	I	II	III	IV	V
specific gravity	1.33	1.31	1.26	1.33	1.34
bulk density not compact	1.29	1.57	1.57	1.52	1.54
apparent density compact	2.70	2.84	2.81	2.77	2.72
specific gravity	2.95	3.05	3.04	3.03	3.04
absorption of water	4.9	6.0	5.3	3.0	3.5
calculated porosity %	8.5	6.9	7.6	8.6	10.5
Particles 1) friables 2) vitreous 3) porous			50		
Resistance to abrasion					
Inerts also granites					
Resistance to static compression					
caliber passing % 2mm			16.7	15.5	11.9
Shape index E/L		0.475	0.509		0.360

Chemical analysis	crushed slag	crystallized 4-8 slag	crystallized 8-12 slag	crystallized 12-16 slag	crystallized 16-32 slag
CaO	44.22	43.70	43.87	43.89	44.19
Fe	0.57	0.67	0.49	0.43	0.35
MnO	0.48	0.50	0.51	0.49	0.51
SiO ₂	33.17	33.63	33.51	33.54	33.70
H ₂ O	3.89	3.83	3.87	4.02	4.05
Al ₂ O ₃	15.43	15.27	15.20	15.36	15.42
S	0.78	0.82	0.76	0.85	0.80

Cement

1. Nature and quality of cement PF 400
2. Designation of the test Study, BAR Highway
- 3.

TB 4

Test results	Dim.	1	2	3				
4. Finesse % retained on sieve 45mm	%							
5. Finesse % retained on sieve 0.09mm	%	0,24						
6. Specific surface (Blaine)	cm ²							
7. Water for standard paste	%	32,30						
8. Time of setting (Vicat)	Beginning	4,30						
	End	5,25						
9. Volume change of paste after 24hrs After 1 hr in boiling water Total width	mm	0,55						
	mm	1,00						
	mm	2,00						
10. Water for standard paste	E/C	0,50						
11. Consistency (Hoegermann)	cm	17,50						
12. Flexural strength after 1 day (N/mm ²)								
	after 3 days	44	45	46	45			
	after 7 days	59	54	56	56			
	after 28 days	78	80	74	77			
13. Compressive strength after 1 day								
	after 3 days	257	247	263	256			
	after 7 days	378	371	377	375			
	after 28 days	598	593	602	598			
14. Chlorid content	%							
15. Heat of hydration J/H		1	2	3	4	5	6	7

Minimal strength N/mm ² by CT 2/75	Compressive strength				Flexural strength				
	Days	1	3	7	28	1	3	7	28
Class 300	-	-	160	300	-	-	30	50	
Class 400	-	160	300	400	-	30	50	60	
Class 500	160	300	-	500	30	50	-	70	

Tabla 4.- Propiedades del Cemento Portland de Hierro Usado (PF 40) calidad 40.

Tabla 5.- Propiedades del cemento de escoria de A.H. usado (HF 40), calidad 40.

Cement

1. Nature and quality of cement HF 405
2. Designation of the test Study BAR Highway

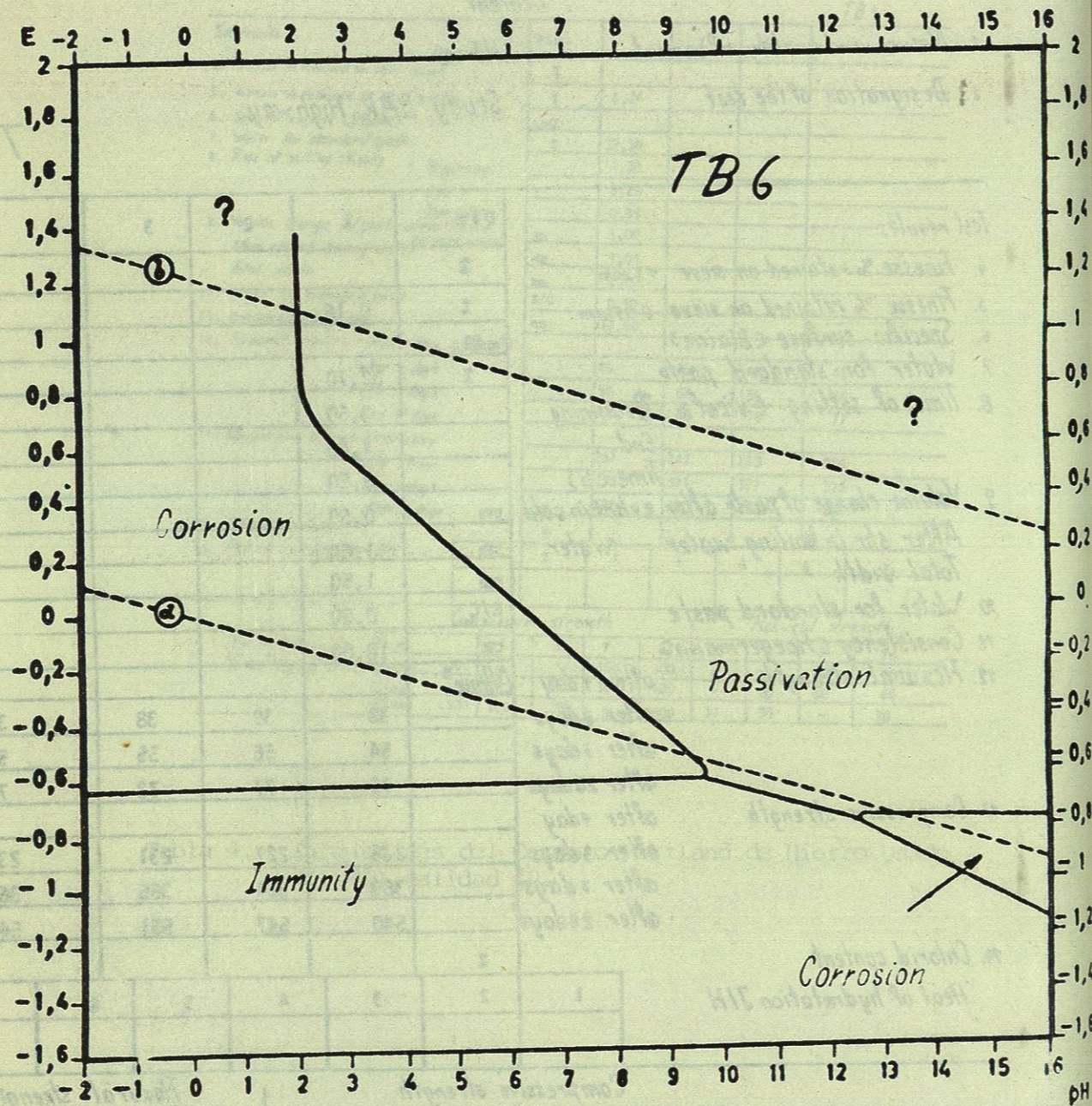
TB 5

Test results.

Dim.	1	2	3					
4. Finesse % retained on sieve 1.2 mm	%							
5. Finesse % retained on sieve 0.09mm	%	0,16						
6. Specific surface (Blaine)	cm ²							
7. Water for standard paste	%	32,70						
8. Time of setting (Vicat)	Beginning	3,50						
	End	4,40						
9. Volume change of paste after 24hrs in cold water After 1 hr in boiling water Total width	mm	0,50						
	mm	1,00						
	mm	1,50						
10. Water for standard paste	E/C	0,50						
11. Consistency (Hoegermann)	cm	18,00						
12. Flexural strength after 1 day (N/mm ²)								
	after 3 days	38	30	38	38			
	after 7 days	54	56	55	55			
	after 28 days	75	77	73	75			
13. Compressive strength after 1 day								
	after 3 days	236	227	231	231			
	after 7 days	363	364	365	364			
	after 28 days	540	547	551	546			
14. Chlorid content	%							
15. Heat of hydration J/H		1	2	3	4	5	6	7

Minimal strength N/mm ² by CT 2/75	Compressive strength				Flexural strength				
	Days	1	3	7	28	1	3	7	28
Class 300	-	-	160	300	-	-	30	50	
Class 400	-	160	300	400	-	30	50	60	
Class 500	160	300	-	500	30	50	-	70	

Tabla 6.- Diagrama - Pourbaix



Corrosion, immunity and passivation areas of iron at 25°C

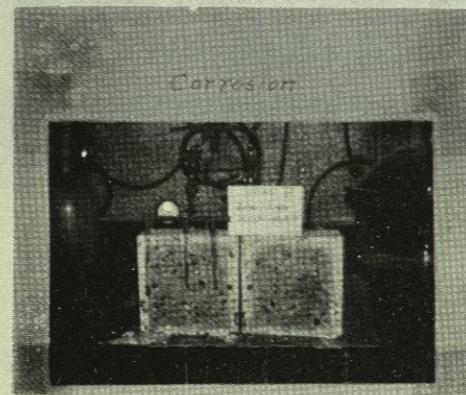


Fig. 1

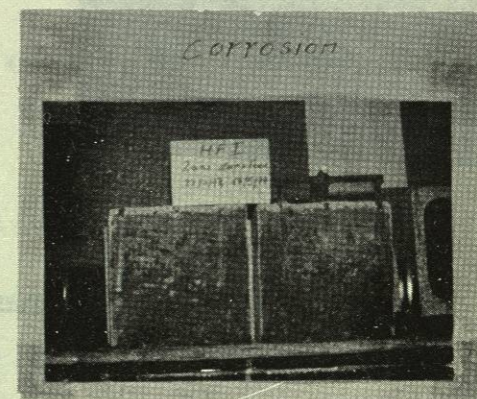


Fig. 3

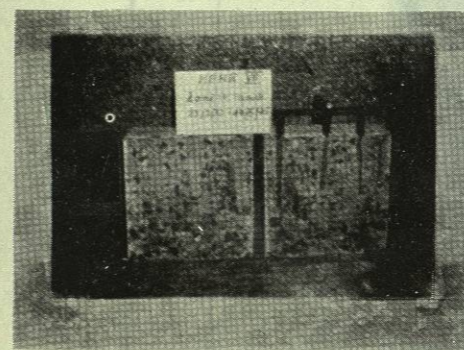


Fig. 2

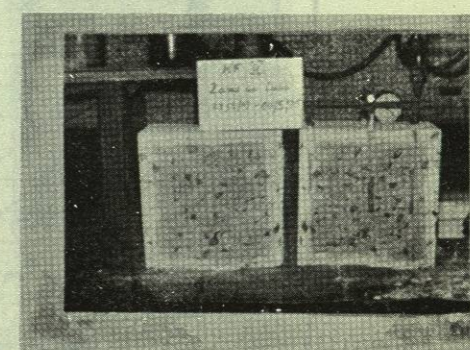


Fig. 4

Figs. 1, 2, 3 y 4.- Carbonatación del Concreto y la Corrosión de las Varillas.