

Volume 3 / No. 2
December 2000

CONCRETE NEWS

ACI- Kuwait Chapter



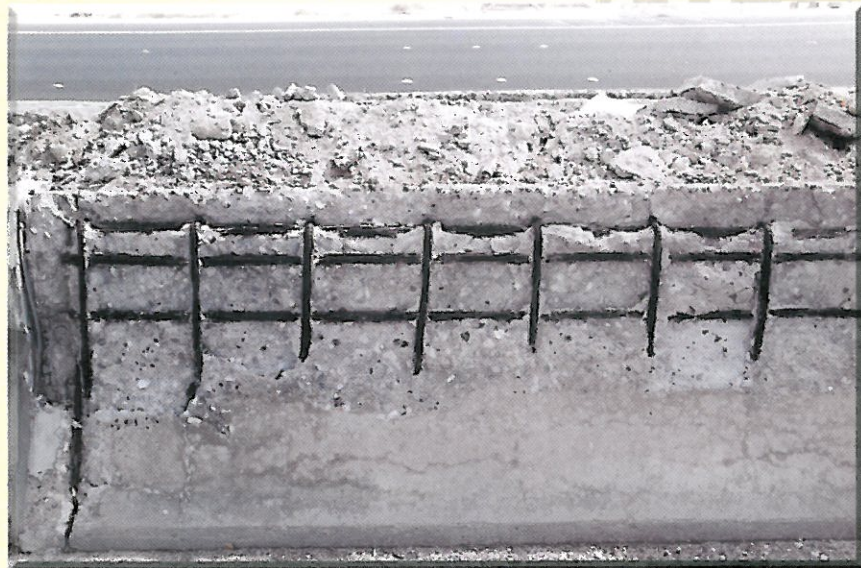
Kuwait International Fair



Concrete, Construction & Design
Exhibition
9 - 13 April 2001



Kuwait Chapter



ACI - Kuwait Chapter
Kuwait Society of Engineers - KSE
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CALENDER OF EVENTS 2000

26 - 31 March 2000	Exhibition: The 2nd Construction & Concrete Expo 2000
2 May 2000	Technical Seminar: "Designing Durable Concrete Structure According to the ACI, Australian and Euro code 2"
16 May 2000	Social Event: Dinner at MAYES AL-GHANEM
27 - 29 May 2000	Technical Training: "Design, Detailing and Construction Requirements of Concrete Structures in Hot and Marine Environments"
June 2000	Newsletter: Volume 3 / No. 1
Oct. 2000	Social Event: Dinner at Chinese Restaurant, Laila Gallery
15 - 17 Oct. 2000	Technical Training: "Introduction to Construction Management"
17 Nov. 2000	Technical Seminar: "Cracking in Concrete: A Panel Discussion"
Dec. 2000	Newsletter: Volume 3 / No. 2
Dec. 2000	Election: With Dinner at KSE

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New naphtha processors proposed for Mina al-Ahmadi refinery

■ Kuwait

Tow new naphtha processing units, each with a capacity of 18.000 barrels a day, will be installed at the Mian al-Ahmadi refinery as part of its reconstruction and upgrade. A licensor will be appointed by the end of the year to carry out process designs for the two new units.

"We will set up two naphtha continuous catalytic reformer units," says a Kuwait National Petroleum Company (KNPC) official.

The refinery repairs are expected to centre on two gas processing units, badly damaged in the 25 June explosion. KNPC is considering replacing them with a single unit of higher capacity.

"We are evaluating a proposal to replace (Fractionation unit) FU-1 and FU-2 with a new unit or build a fourth train at the nearby gas processing facility in the refinery complex," the official says.

The capacity of the new train is currently under

discussion. It will process condensates gas feedstock for the refinery. The three trains in the gas processing facility have a capacity of 560 million cubic feet a day each.

KNPC's decision to proceed with refinery repair and upgrade work follows an agreement reached in late October with Kuwait insurance Company over the insurance claim arising from the explosion (MEED 20:9:00).

"Minor repair on the refinery will be carried out by contractors on site," the official says. South Korea's SK Engineering & Construction Company will complete work by the end of December on an KD 850.000 (\$2.8 milion) contract for the supply and installation of five pipelines at the refinery (MEED 10:11:00).

Glimpse on the Construction Business in Kuwait

Substation

Supply and installation of two 132/11-kV substations at Mina Abdulla E and Sabhan C for the Ministry of Electricity & Water. The construction period is 24 months.

Building construction

Tender no PAI/1. Construction, completion and maintenance of a building for the Public Authority for Industry's new headquarters at the ministries area in southern Surra.

Architectural finishing works

Tender no KPC/6/V/1998. (Open to prequalified contractors only.) Carrying out internal architectural finishing works for oil sector complex projects for Kuwait Petroleum Corporation.

Swimming pool complex

Tender no PAYS/24/2000-2001. (Open to prequalified contractors only.) Construction, completion and maintenance of an olympic swimming pool complex at the Qadasiya Authority for Youth & Sports.

Vehicle lease

Tender no HM/7/2000. (Open to prequalified contractors only.)

Leasing of vehicles for the Petrochemical Industries Company.

Catering services

Tender no REP/199. Provision of catering services for Kuwait Oil Company.

Substation construction

Tender no REP/188. (Open to prequalified contractors only.) Construction of a new centralised substation in gathering centre no 17 in the west for Kuwait Oil Company. Bid bond is 2 percent of tender price.

Hospital auto-control systems

Tender no MPH/2/2000/2001. (Open to prequalified contractors only.) Supply, operation and maintenance of auto-control systems for the Health Ministry's hospitals and health centres.

Mechanical and electrical equipment O&M

Tender no 4532800 (Open to prequalified contractors only.) Complete repair, operation and maintenance (O&M) of mechanical and electrical equipment for the Defence Ministry.

Mechanical and electrical

equipment O&M

Tender no 4522800 (Open to prequalified contractors only.) Complete repair, operation and maintenance (O&M) of mechanical and electrical equipment for the Defence Ministry.

Fuel stations

Tender no TM/28/2000. (Open to prequalified contractors only.) Design, manufacture, supply, installation and operation of four mobile fuel stations for Kuwait National Petroleum Company's local marketing department.

Computer equipment and network

Tender no S/MTH/1/2000-2001 Supply of computer equipment, an information transmission network and accessories for the Health Ministry's primary healthcare support.

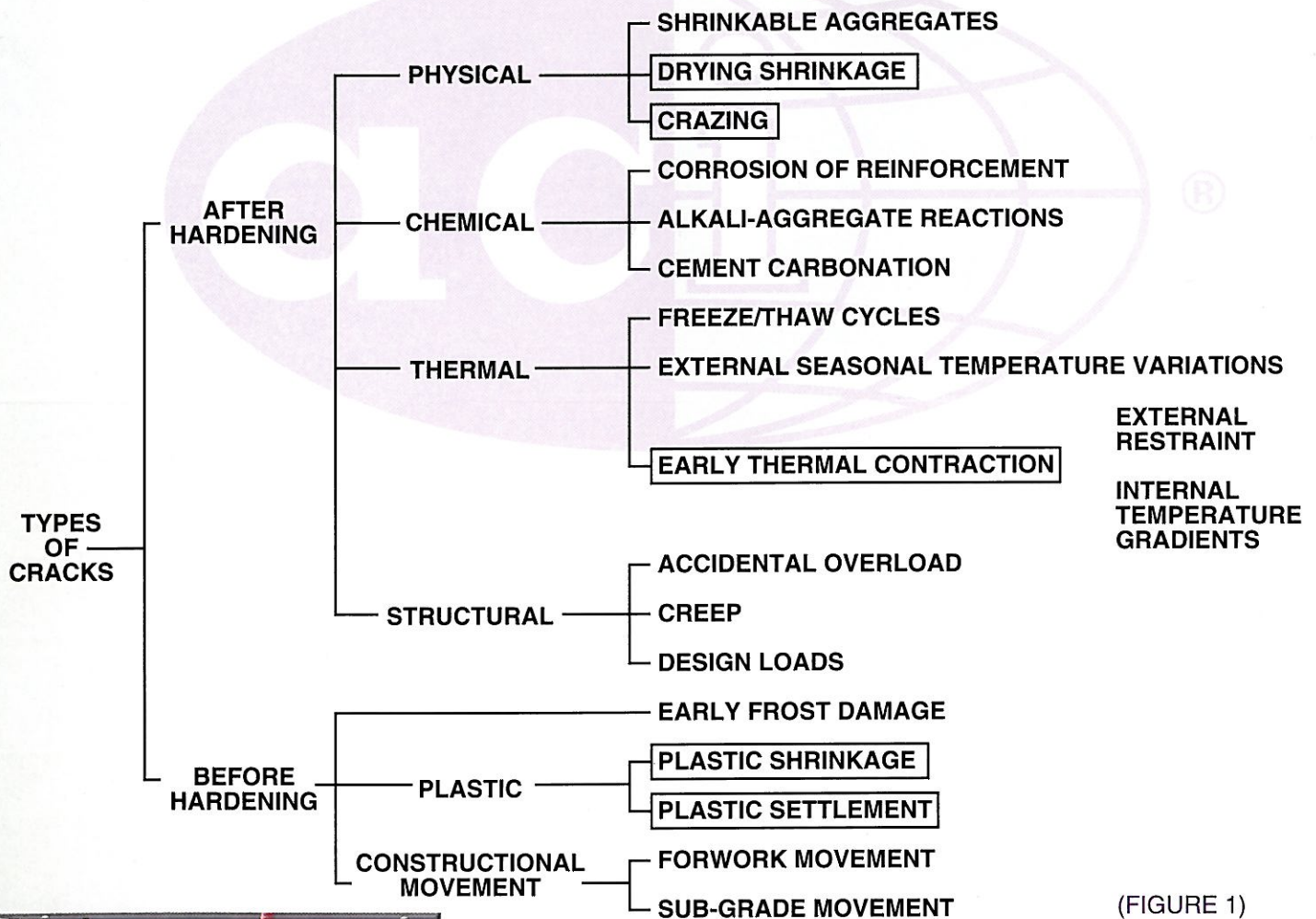
Electrical works maintenance

Tender no 1599/CS. (Open to prequalified contractors only.) Maintenance of electrical works for Kuwait National Petroleum Company's Shuaiba refinery.

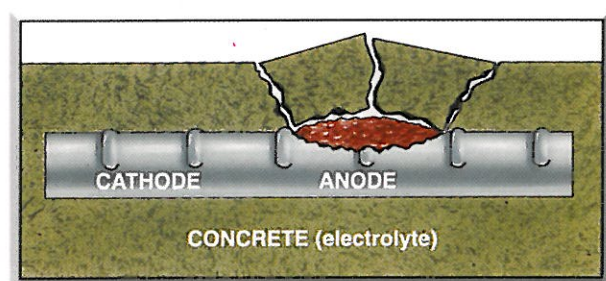
Cracking in Concrete A Researcher's View

By
Dr. Moetaz El-Hawary
Kuwait Institute for Scientific Research

Cracking occurs when the tensile strain exceeds the tensile strain capacity in concrete. Strain may be due to movements within concrete, expansion of materials embedded in concrete or due to external conditions. Classification of the crack type is essential for assessment, repair or to avoid its occurrence in the first place. Different types of classifications are available. One common type is shown in Figure 1 in which cracks are divided into two major groups according to time of occurrence, before or after hardening. Each is then divided into sub-groups as shown. The different types of cracks are also summarized in Table 1 along with their sub-divisions, common locations, causes, remedy and time of appearance.



(FIGURE 1)



Cracking in Concrete A Researcher's View

The construction industry in Kuwait has advanced in recent years and reached a satisfactory level especially for large and medium sized projects. Structural cracks very seldom occur and cracks related to detailing are decreasing due to the professionalism of most consulting offices. The quality of concrete is improving and the control measures are generally followed. Most contractors are taking measures to assure that "before hardening" cracks do not occur. The types of cracks that are still common in Kuwait and require lots of attention, are the chemical cracks. This is due to two reasons, first the environment in Kuwait, which is characterized as hot and their rate increases with temperature. The second reason is that this type of crack takes more than two years to occur and by that time the precise determination of the takes more than two years to occur and by that time the precise determination of the responsible party is difficult. The two most common types of chemical cracks are the corrosion of reinforcement and the alkali-aggregate reactions. The former, however, has gained some attention lately as some research projects are carried out and some new techniques and materials are being introduced to avoid corrosion. Focus should be geared to the alkali-aggregate reactions especially with the introduction of many imported types of aggregates that might be alkali reactive. Specifications regarding alkali reactivity should be followed and measures to avoid this type of reaction should be set. Research projects particular to alkali-aggregate reaction in the environment of Kuwait should be encouraged and promoted.

Type of cracking	Letter	Sub-division	Common location	Primary cause	Secondary cause	Remedy	Time of appearance
Plastic settlement	A	Over reinf.	Deep sections	Excess bleeding	Rapid early drying	Reduce bleeding (air entrainment or re-vibration)	Ten minutes to three hours
	B	Arching	Top of columns				
	C	Change of depth	Waffle slabs				
Plastic shrinkage	D	Diagonal	Roads and slabs	Rapid early drying	Low rate of bleeding	Improve early curing	Thirty minutes to six hours
	E	Random	Reinf. slabs				
	F	Over reinf.	Reinf. slabs	And small cover			
Early thermal contraction	G	External restraint	Thick walls	Excess heat generation	Rapid cooling	Reduce heat or insulate	One day to two weeks
	H	Internal restraint	Thick slabs	Excess temperature gradient			
Long term drying shrinkage	I		Thin slabs and walls	Inefficient joints	Excess shrinkage, inefficient curing	Reduce water content , improve curing	Several weeks or months
Crazing	J	Against form-work	Fair faced concrete	Impermeable formwork	Rich mixes, Poor curing	Improve curing and finishing	One to seven days
	K	Floated concrete	slabs	Over trowelling			
Corrosion of reinforcement	L	Natural	Columns and beams	Lack of cover	Poor quality concrete	Eliminate causes	More than two years
	M	Calcium chloride	Precast concrete	Excess chloride			
Alkali-aggregate reaction	N		Damp locations	Reactive aggregates plus high alkali cement		Eliminate causes	More than five years



CHANGING FROM BRITISH TO EUROPEAN CEMENT STANDARDS

INTRODUCTION

New European Standards for cement have just been published in the UK as British Standards. BS EN 197-1:2000⁽¹⁾ is the new harmonised (CE marking) standard for common cements and BS EN 197 - 2 2000⁽²⁾ is the standard for conformity evaluation.

From April 2001, BCA Member Companies will be enabled to manufacture most of their cements in conformity to the new BS EN 197 - 1 specification rather than to a number of the current British Standards i.e. BS 12, BS 6588 and BS 7583. Specifiers and users will, however, still be able to choose familiar cements with the same performance as before and this information sheet should assist them in making the transition to the new BS EN as painless as possible.

Publication and use of BS EN 197 - 1 for common cements

Although BS EN 197 - 1 has already been published by BSI, in practice BCA Member Companies will only begin to supply cements to the new harmonised standard from 1 April 2001. Only from that date does it become legally permissible to affix the CE marking cements. The suite of conflicting British Standards i.e. BS 12, BS 6588 and BS 7583 will, however, co-exist with the new BS EN until 1 April 2002 according to a protocol agreed between the European Commission and Member States' national standards bodies. A particular circumstance has arisen in the case of BS 4246, the specification for high slag blastfurnace cement. Although BS 4246 does not conflict with the new BS EN it is to be withdrawn by BSI. The BS 4246 product, however, will be retained in a revision of BS 146. At revision BS 146 will be re-titled Specification for blastfurnace slag cements outside the scope of BS EN 197 - 1 - and will cover Low Early Strength Slag Cements.

New Features In BS EN 197 - 1

The 1991, and later the 1996, revisions of the British Standards for cement aligned them with the style and much of the content of the new BS EN. Thus the standards will already seem familiar to users in the UK and it is possibly only the notation and the incorporation of most cement types into a single document, BS EN 197 - 1, that will prove to be unfamiliar. Some traditional cements are not specified in BS EN 197 - 1: the particular exceptions are special cement such as sulfate resisting Portland cement to BS 4027, the lower early strength classes of slag cement products in BS 146 and BS 4246 and pozzolanic pulverized fuel-ash cement to BS 6610. These cements will be covered by further parts of BS EN 197 but, until then, the current British standards will apply. Cements whose hardening is not due to the hydration of calcium silicates, e.g. calcium aluminate cement, will be specified under a different EN number. Masonry cement will be covered in Information sheet no. 3 in this series.

European equivalents to British Standard cements

Table 1, overleaf, lists the British Standards for Portland type cements and identifies their equivalents from amongst the 27 common cements specified in BS EN 197 - 1. Of these products, those manufactured in the UK are given in the final column.

Notation and standard designations for cements

The notation for the main types of common cement (CEM I TO CEM V) is given in table 2 with a description of its meaning. Table 3 explains the coding in the notation that indicates the identity of the second main constituent and its proportion. In figure 1, a 'standard designation' for one example of a portland - slag cement is given in order to describe each element in a designation.

Table 1: European equivalents to British Standard cements

British Standard		Cement	BS EN 197-1 cement notation	Clinker content, %	Content of other main constituents, %	BS EN-197-1 cements manufactured in the UK
To be withdrawn	To co-exist beyond 1 April 2002					
BS 12 ¹⁾	BS 4027	Portland cement	CEM I	95 - 100	-	✓
	BS 146 ³⁾	Portland-slag cement	CEM II/A-S	80 - 94	6 - 20	
			CEM II/B-S	65-79	21-35	✓
		Portland-silica fume cement	CEM II/A-D	90 - 94	6 - 10	
		Portland-pozzolana cement	CEM II/A-P	80 - 94	6 - 20	
			CEM II/B-P	65 - 79	21 - 35	
			CEM II/A-Q	80 - 94	6 - 20	
			CEM II/B-Q	65 - 79	21 - 35	
BS 6588 ¹⁾		Portland-fly ash cement	CEM II/A-V	80 - 94	6 - 20	
			CEM II/B-V	65 - 79	21 - 35	✓
-			CEM II/A-W	80 - 94	6 - 20	
			CEM II/B-W	65 - 79	21 - 35	
-		Portland-burnt shale cement	CEM II/A-T	80 - 94	6 - 20	
			CEM II/B-T	65 - 79	21-35	
-		Portland-limestone cement	CEM II/A-L	80 - 94	6 - 20	
BS 7583 ¹⁾			CEM II/A-LL	80 - 94	6 - 20	✓
			CEM II/B-L	65 - 79	21 - 35	
			CEM II/B-LL	65 - 79	21 - 35	
-		Portland-composite cement	CEM II/A-M	80 - 94	6 - 20	
			CEM II/B-M	65 - 79	21 - 35	
-	BS 146 ³⁾	Blastfurnace cement	CEM III/A	35 - 64	36 - 65	✓
BS 4246 ²⁾	-		CEM III/B	20 - 34	66 - 80	✓
			CEM III/C	5 - 19	81 - 95	
-	-	Pozzolanic cement	CEM IV/A	65 - 89	11 - 35	
-	BS 6610		CEM IV/B	45 - 64	36 - 55	
-	-	Composite cement	CEM V/A	40 - 64	36 - 60	
			CEM V/B	20 - 39	61 - 80	

NOTE. See the National Foreword and National Annex N.A to BS EN 197-1 for additional information on the reasons for the withdrawal or continued co-existence of current British Standards and the BS EN.

1) These three British Standards will be withdrawn on 1 April 2002

2) This British Standard will be withdrawn to a time-scale dictated by the revision of BS 146.

3) BS 146 is to be revised to remove any conflict with BS EN 197-1 and to include the current BS 4246 cement.

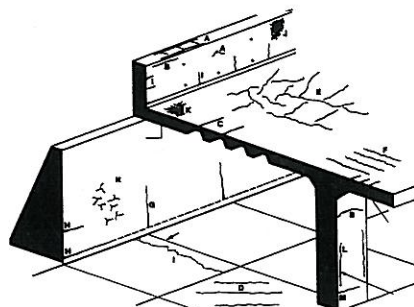


Table 2: Notation for the main cement types

CEM I	Portland cement: comprising Portland cement and up to 5% of minor additional constituents
CEM II	Portland-composite cement: comprising Portland cement and up to 35% of other single constituents
CEM III	Blastfurnace cement: comprising Portland cement and higher percentages of blastfurnace slag
CEM IV	Pozzolanic cement: comprising Portland cement and higher percentages of pozzolana
CEM V	Composite cement: comprising Portland cement and higher percentages of blastfurnace slag and pozzolana or fly ash

Figure 1: An example of a 'standard designation'

Portland-slag cement BS EN 197-1 CEM III/A-S 42.5 N



Examples of intrinsic cracks in hypothetical concrete structure

Sub-class N indicates normal early strength, R indicates rapid early strength

Standard strength class

Sub-type indicates the second main constituent, in this case, slag

Indicates higher (A), medium (B) and lower (C), proportion of Portland cement clinker

Main cement type

Table 3: Notation for the second main constituent

S	blastfurnace slag
D	silica fume;
P	natural pozzolana;
Q	natural calcined pozzolana;
V	siliceous fly ash (e.g. pfa);
W	calcareous fly ash (e.g. high-lime fly ash);
L and LL	limestone;
T	burnt shale;
M	two or more of the above.

Standard strength classes for common cements

Standard strength classes of cements were introduced in the UK in the 1991 revisions of the British Standards but are described, Again here for completeness. The standard strength class of a cement classifies its performance at 28 days, using the procedure of BS EN 196 methods of testing cement. Part 1 : compressive strength test for compressive strength (mpa). Each class spans a conformity band of 20 mpa (n/mm²), defined by upper and lower limits as shown in Table 4. These limits are characteristic rather than absolute and permit up to 5 % of test results to fall below the lower limit by not more than 2.5 mpa and up to 10 % to exceed the upper limit. The lower characteristic value defines the standard strength class. Cements are also tested at ages of 2 days or 7 days, depending on the required performance of the product, in order to establish an overall strength class' which codifies standard strength with early strength.

Table 4: Strength classes

Compressive strength, MPa (N/mm ²)				
Class	Early Strength 2day	7days	Standard strength 28 days	
32.5N 32.5R	- > 10.0	> 16.0 -	> 32.5	> 52.5
42.5N 42.5R	> 10.0 > 20.0	-	> 42.5	> 62.5
52.5N 52.5R	> 20.0 > 30.0	-	> 52.5	-

Harmonisation and CE marking

Harmonisation is a concept new to standardisation in the Member States of the EU. It introduces a legal/ regulatory dimension into documents that previously would have had only voluntary status. The harmonised parts of European Standards are those that are required for the purposes of the Construction Products Directive (CPD) and in the case of common cements the whole of BS EN 197-1 is harmonised. As a result of this the CE marking affixed to a cement delivery note, or on a bag of cement, indicates that the cement conforms to all the requirements of the harmonised standard and that it meets the minimum legal requirements necessary for placing on the single European market.

Attestation of conformity

Attestation of conformity (AoC) is the legal means by which a manufacturer can demonstrate and then declare that his product conforms to a harmonised standard. Different levels (Systems') of attestation are appropriate for construction products depending on the implications, in terms of the integrity of finished 'works', of a failure to conform. The level set for common cements by the European Commission was 'system 1+', the highest level. This requires independent sampling and testing of the cement in addition to the requirement for manufacturer's factory production control. The rules by which conformity of

cement is now established are provided, for the first time in a British Standard, in BS EN 197-2.

The key issues for the future

Traditional British cements are still available but under European designations, with performance unaffected and with even higher levels of product certification.

The new British/European Standard brings with it new notation and opportunities for new cement types in the UK.

Specifiers and users now need to embrace the new terminology, in common with users in the rest of Europe, in order to understand its usage in:

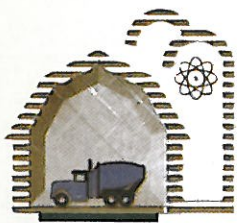
- the European standard for fresh concrete
- the UK complementary standard for concrete
- the European Standards for mortars and grouts.

References



NEW EUROCEMENTS





Concrete, Construction & Design Exhibition 9 - 13 April 2001



*Al-Hoti & Al-Gharably
Signing the Exhibition Contract*

Under the sponsorship of ACI (American Concrete Institute) - Kuwait Chapter, Kuwait International Fair Company will organize the **Concrete, Construction & Design** Exhibition from 9th to 13th April 2001, in Hall No.(7), at the Int'l Fairs Ground, Mishref.

Concrete is the main, if not the absolute, building material used extensively in the Arabian Gulf region. This exhibition is expected to be the most relevant exhibition related to construction & concrete in the area. The exhibition will be attracting quality suppliers, manufacturers, contractors and consultant firms from regional and international contributors. Kuwait International Fair Company will do a big advertising campaign and a wide coverage of the event as well. Seminars and Press Conferences are also being planned to take place during the exhibition period. We take the pleasure of inviting you to participate at the above-mentioned exhibition.

USEFUL LINKS

American Concrete Institute: <http://aci-int.org/>



American Society For Testing And Materials: <http://www.astm.org/>



The World Of Concrete : <http://www.worldofconcrete.com/>



American Society Of Civil Engineers: <http://www.asce.org/>



Building Research Establishment: <http://www.bre.co.uk/>



Synthetic Industries, Inc. - Fibermesh: <http://www.fibermesh.com/>

