SIKA AT WORK

Sika ViscoFlow® TECHNOLOGY CONSTRUCTION OF EASTERN DRAINAGE TUNNEL

(TÚNEL EMISOR ORIENTE)

BUILDING TRUST

Sika ViscoFlow® TECHNOLOGY FOR TÚNEL EMISOR ORIENTE

Let the concrete flow for hours

PROJECT DESCRIPTION

Mexico City, and its metropolitan area, was built over an area what was once an area of lakes. As it has grown the city has gained ground from the lakes and consequently it has faced the great problem of floods. At present, the installed capacity of the drainage system in the metropolitan area is insufficient and creates serious problems. Comparing the capacity it had in 1975 with the capacity today, which is 30% lower with almost double the population shows the need for an increase in the drainage capacity. Furthermore it is necessary to close the Central Emitter Outlet during the months of low water level for its repair and maintenance. Therefore it is necessary to have an alternative emitter outlet that allows maintaining the operation capacity of the system throughout the year since the current drainage system is insufficient for the actual needs of the Valley of Mexico. Technical date of the East Emitter Outlet Tunnel:

Length	62 km
Diameter	7 m
Depth	30 to 150 m
Slope	100 m
Shafts	24
Capacity	150 m^3/sec
Return Period	50 years
Investment	approx. 1'600 million US$
Construction Time	7 years (2009 – 2016)
Year of completion	2016

PROJECT REQUIREMENT

Sika Mexicana is participated with the Mexican contractor company ICA in the final lining. The concrete for this final lining must comply with the following characteristics:

- Class I Structural Concrete
- Compressive strength of 34.3 MPa (350 kg/cm^2)
- w/c-ratio: maximum 0.45
- Maximum aggregate size: 3/4"
- 3 hour of workability time
- Initial slump of 26 cm on arrival at the installation point with slump of 22 ± 3.5 cm.
- Compressive strength after 12 – 14 hours must be higher than 3.4 MPa (35 kg/cm^2)

The concrete will be pumped up to depth of around 95 m and over a maximal distance of 1000 m length. The volume of the segment done by ICA is of approximately 230,000 m^3 of concrete.

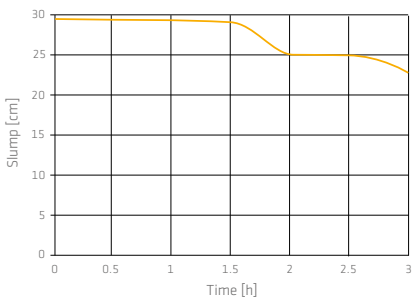
Compressive Strength after 12 – 16 hours

Time [h]	Compressive strength [MPa]
12	5.8
14	7.7
16	13.3

SIKA SOLUTIONS

The combined use of the the Sika ViscoFlow® technology in form of Sika ViscoFlow®-10, Sika ViscoFlow®-20 E, Sika ViscoFlow®-50 and Sika® Plastiment® Liquid resulted in a good quality concrete which fulfilled the requirement concerning workability retention time requirement. Furthermore the time requirement for the compressive strength has been exceeded by the combination of mix design and Sika admixtures.

Concrete workability (Slump) over time with Sika ViscoFlow® technology

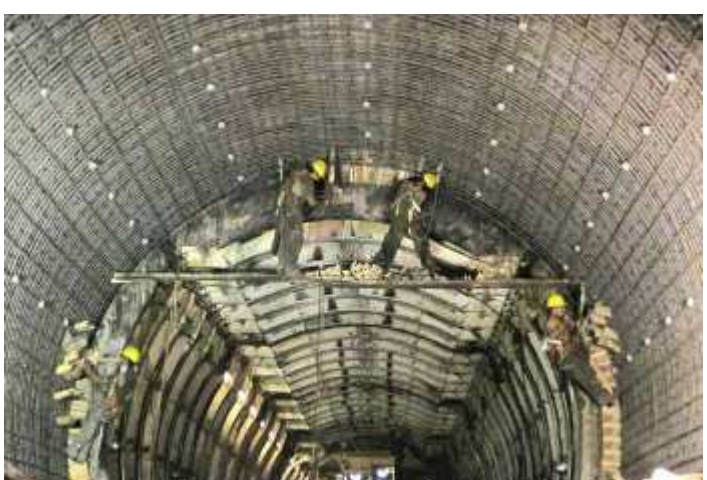


In the end the proposed mix designs using the Sika ViscoFlow® technology fulfilled the project specification and were successfully used throughout the construction phase.

SIKA PRODUCTS

In addition the following Sika products were used in the project

Sika® Plastiment® Liquid
Sika ViscoFlow®-10
Sika ViscoFlow®-20 E
Sika ViscoFlow®-50
Sikament®-307
SikaPlast® SC
Sigunit® PC
Sigunit®-49 AF
SikaFoam TBM (M) 101 FB
SikaTop®-121
SikaFlex®-1A
SikaPump®
Sikadur®-32
SikaGrout®
Sika® Separol® (Desmoldante Plus)
Sika® Curador
SikaFiber®



MEXICANA AND Sika ViscoFlow® TECHNOLOGY, TÚNEL EMISOR ORIENTE

PROJECT PARTICIPANTS
Conagua: Comisión Nacional del Agua
Comissa: Constructora Mexicana de Infraestructura Subterránea, S.A. de C.V.
ICA: Ingenieros Civiles Asociados, S.A. de C.V.
Carso: Carso Infraestructura y Construcción, S.A. de C.V.
Cotrisa: Construcciones y Trituraciones, S.A. de C.V.
Cesa: Constructora Estrella, S.A. de C.V.
Lombardo: Lombardo Construcciones, S.A. de C.V.

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