RCT data

15.09.1998

Rapid Chloride Test

Summary of 14 correlations between RCT measurements and laboratory measurements (Volhardt titrations, colour titrations, ion chromatography measurements and auto analyses)

By courtesy of:

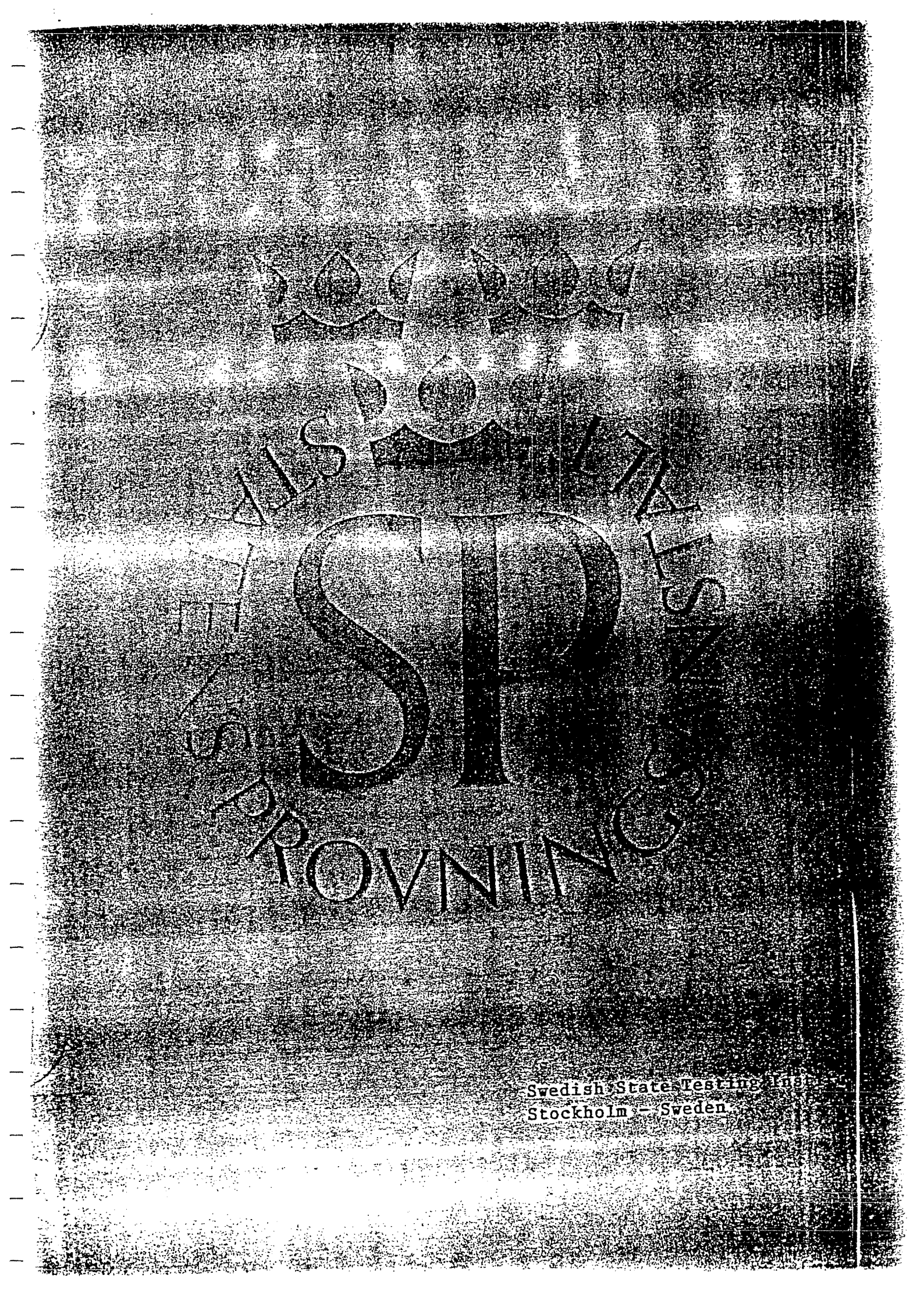
(1): Statens Provningsanstalt (The Swedish State Testing Institute)
(2): Cement och Betonginstitutet (The Swedish Cement and Concrete Research Institute)
(3): The Technical University of Espoo, Finland
(4): Norwegian Concrete Technology
(5): Cowiconsult, Consulting Engineers, Denmark
(6): Birch & Krogboe, Consulting Engineers, Denmark
(7): The Institute of Technology, Denmark
(8): Trow Group, Consulting Engineers, Canada
(9): The Road Directorate, Denmark
(10): BPS-Center, Denmark
(11): The Technical University of Denmark
(12): European Storebælt Group, Denmark
(13): Ponts et Chausses, Luxembourg
(14): Strategic Highway Research Program (SHRP), USA

Enclosed comparisons between RCT and RCTW

GERMANN INSTRUMENTS A/S

Emdrupvej 102, DK-2400 Copenhagen, Denmark

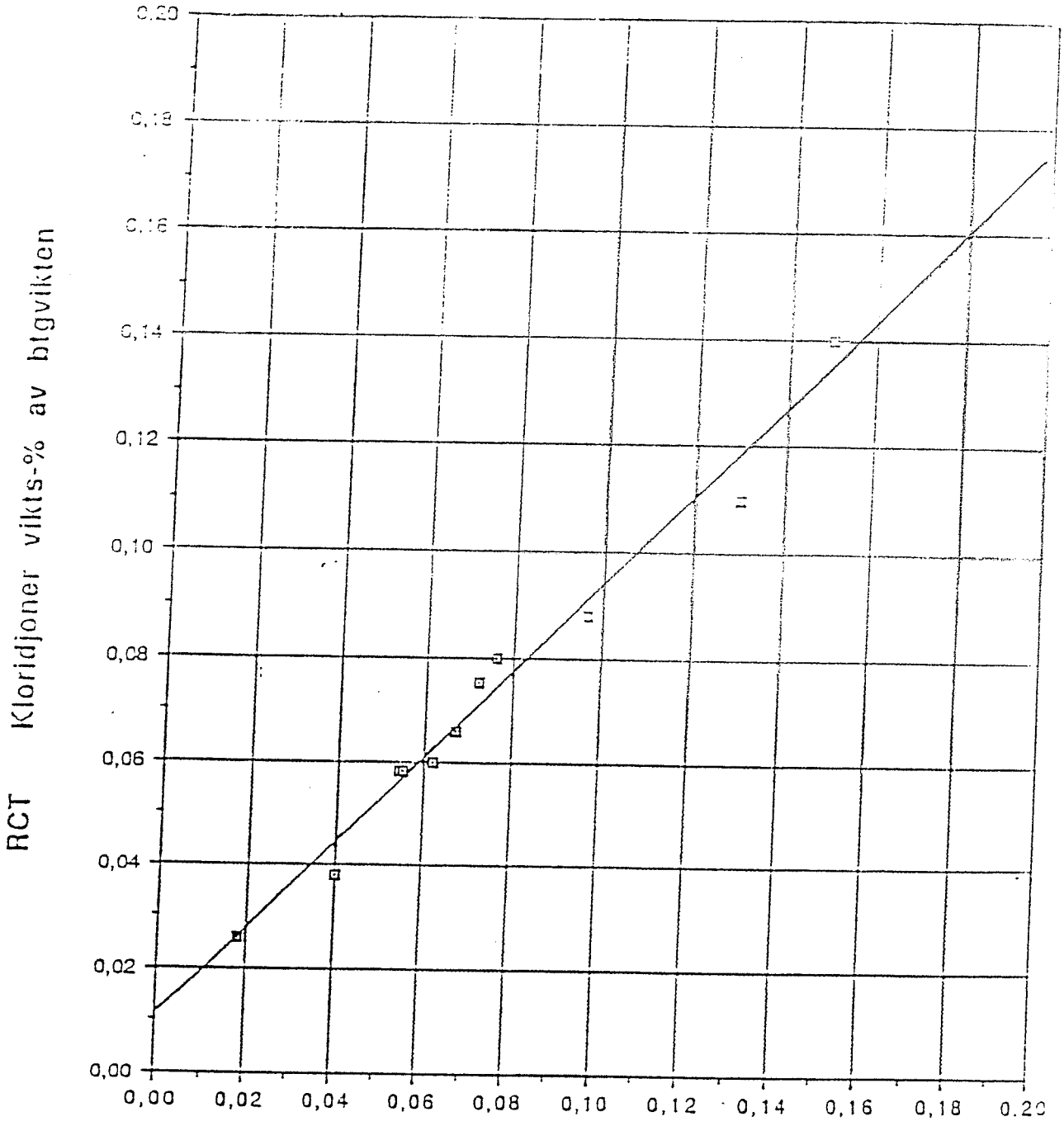
Phone: +45 39677117, Fax: +45 39673167


STATENS
PROVNINGS
Swedish State Testing Inst.
Stockholm - Sweden

SP S11

JÄMFÖRELSE AV TVÅ METODER ATT BESTÄMMA KLORIDHALTEN I BETONG

Klorid Cl^- vikt-% av betongvikten	Klorid Cl^- vikt-% av betongvikten
Jonkromatografi	RCT-metoden
0,040	0,038
0,076	0,080
0,072	0,075
0,055	0,058
0,018	0,026
<0,010	<0,003
0,130	0,110
0,150	0,140
0,097	0,088
0,067	0,066
0,054	0,058
0,062	0,060



Jonkromatografi Kloridjoner vikts-% av btgvikten

Cement och Betong Institutet

Datum/Date | Beteckning/Reference | Er datum/Your date | Er Beteckning/Your Reference

1992-03-31 | EJ/KG

Materialröntgen
Manufakturgatan 7
417 07 GÖTEBORG
Fax 031/235894

Bestämning av kloridhalt

Då värdena på föregående bestämning verkade orimligt höga vägdes 5 gram prov upp och titrerades enligt Volhard (se B1 1960 statliga cementbestämmelser).

Följande värden erhölls:

TITRATION

Prov nr	Kloridhalt % Cl^-/btg	RCT MATERIALRÖNTGEN
1	0,19	0,199
2	0,16	0,168
3	0,11	0,111
4	0,09	0,111

Detta uppvisar att de föregående redovisade värdena är felräknade med en tiopotens.

Jag ber så mycket om ursäkt.

Med vänlig hälsning

CEMENT OCH BETONG INSTITUTET
Beständighetsgruppen

Eva Jeppsson

Eva Jeppsson

Swedish Cement and Concrete Research Institute

Mail: CBI, S-100 44 STOCKHOLM | Office: Drottning Kristinas väg 26 | Phone: Nat 08-14 32 20, Int +46 8 14 32 20 | Telegram: CementInstitute | Telefax: 08-24 11 37 | Bankers: Svenska Handelsbanken | Bank Giro Acc. 728-4631 | Postal Giro Acc. 14 85 40-8

SUMMARY

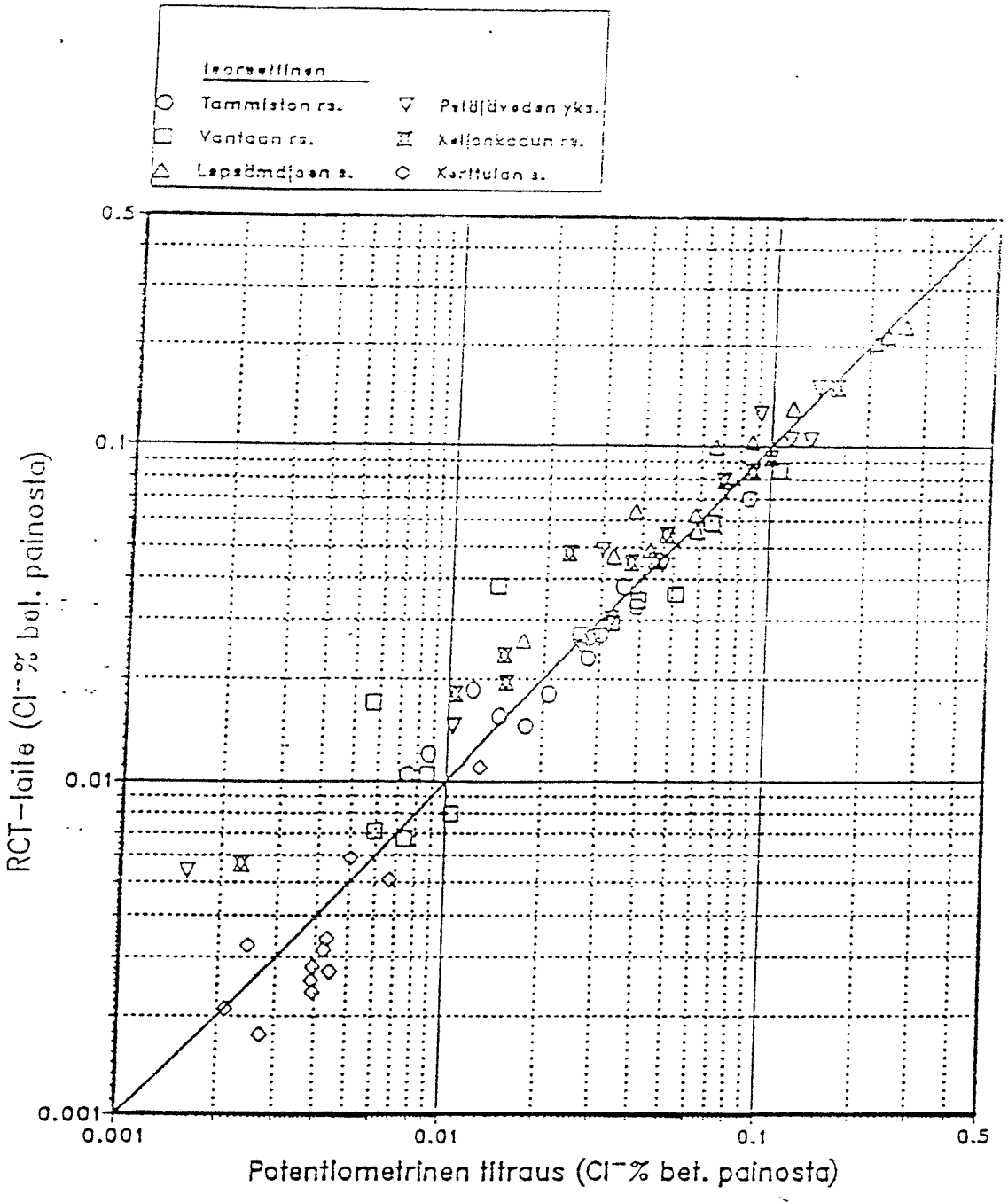
This study is concerned with the suitability of Rapid Chloride Test -method (RCT-method) developed by Germann Instruments to the in situ determination of chloride content of concrete. The work consists of laboratory tests and in situ tests on bridges. The accuracy of the RCT-test was determined by comparing the RCT-values with the values produced by other methods.

A known amount of chloride was added to twelve different concretes manufactured in the laboratory. Rapid and normally hardening Portland cements (P 40/7 and P 40/28) were used as binders, compression strength values of the concretes ranged from 35 to 60 MN/m^2 and chloride contents of the concretes were 0.2, 1 and 3 % $CaCl_2 \cdot 2H_2O$ by mass of cement, (0.0113 - 0.228 % Cl^- by mass of concrete). The chloride content of the hardened test concretes were determined by RCT-method, by potentiometric titration and in some cases by watersoluble chloride method. The chloride content determined by the RCT-test was on the average 79.9 % from the added chloride content. The corresponding value using the potentiometric titration method was 95.8 % and the watersoluble chloride amount was on the average 58.5 % from the added chloride content. The maximum error caused by the weighting procedure of the RCT-test was evaluated to be 14 per cent. Also temperature differences can easily cause considerable faults.

In the bridge tests five highway bridges and one light road bridge were investigated. The test specimens were taken from six places and from two depths (0-2 cm and 2-5 cm). The chloride content was determined at the bridge location by the RCT-test and later in laboratory by potentiometric titration method. The RCT-test values were on the average 15.9 % higher than the titration values, but in 53 % of the cases the RCT value was smaller than titration value. In few cases the RCT value was 2-3 times higher than the corresponding titration value. The reason for these exceptional values could not be clarified.

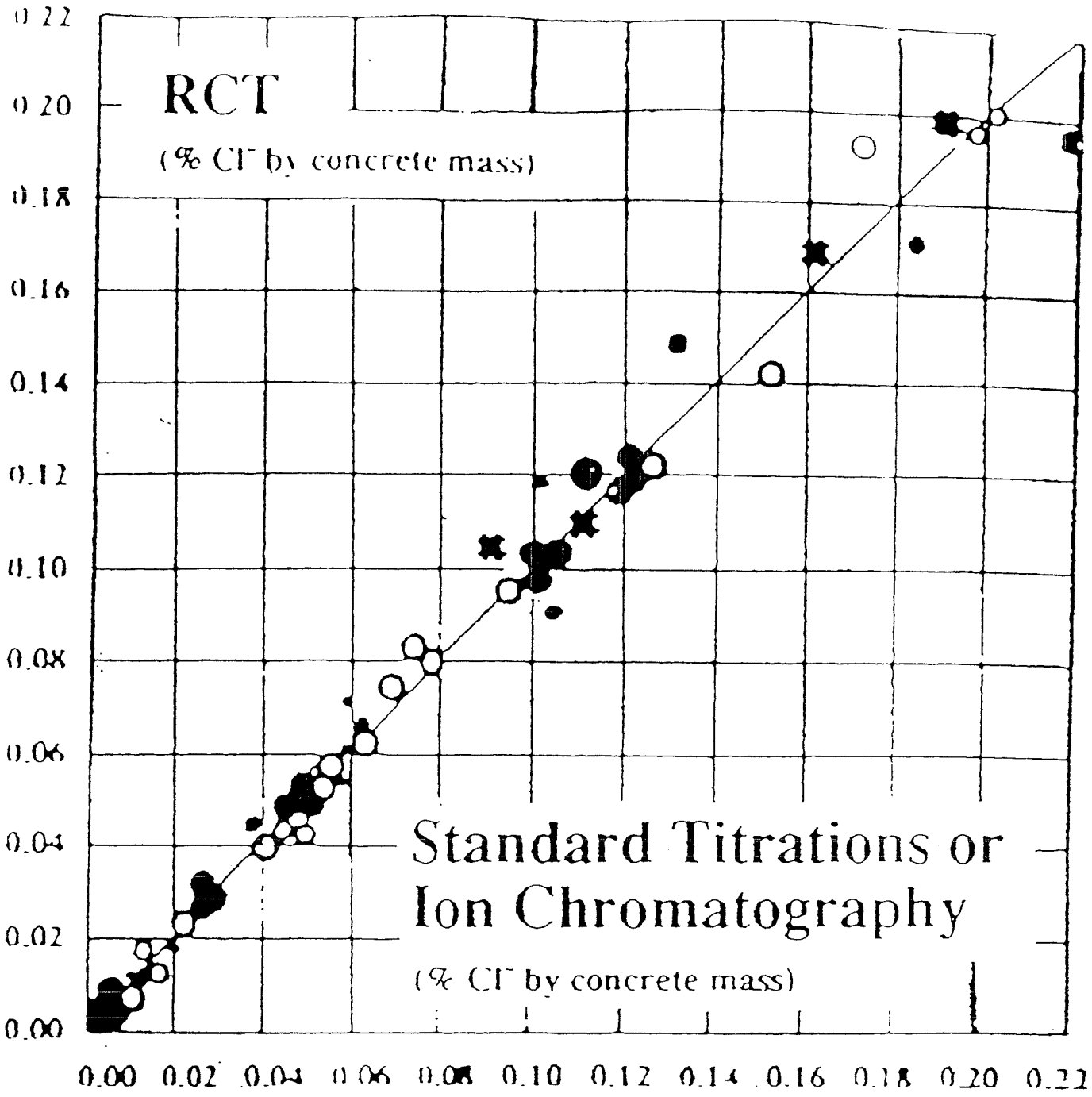
RCT-test turned out to be quite useful in the in situ determination of concrete chloride content. The total expenses were about 110 FIM/sample.

Punkki, J. & Penttala, V., In situ determination of chloride content in concrete bridges (in Finnish). Espoo 1988. Helsinki University of Technology, Department of Structural Engineering, Report 96. 76 p.



Kuva 13. RCT-laitteella sekä titraamalla saatujen siltakokeiden tulokset.

Tutkittujen maantiesiltojen kloridipitoisuuksien tasoa vertailtiin siltojen reunapalkkien keskimääräisten kloridipitoisuuksien avulla. Vertailua suoritettaessa on otettava huomioon tutkittujen reunapalkkien vaihteleva etäisyys ajoradasta. Eri siltojen reunapalkkien kloridipitoisuudet on esitetty taulukossa 20.



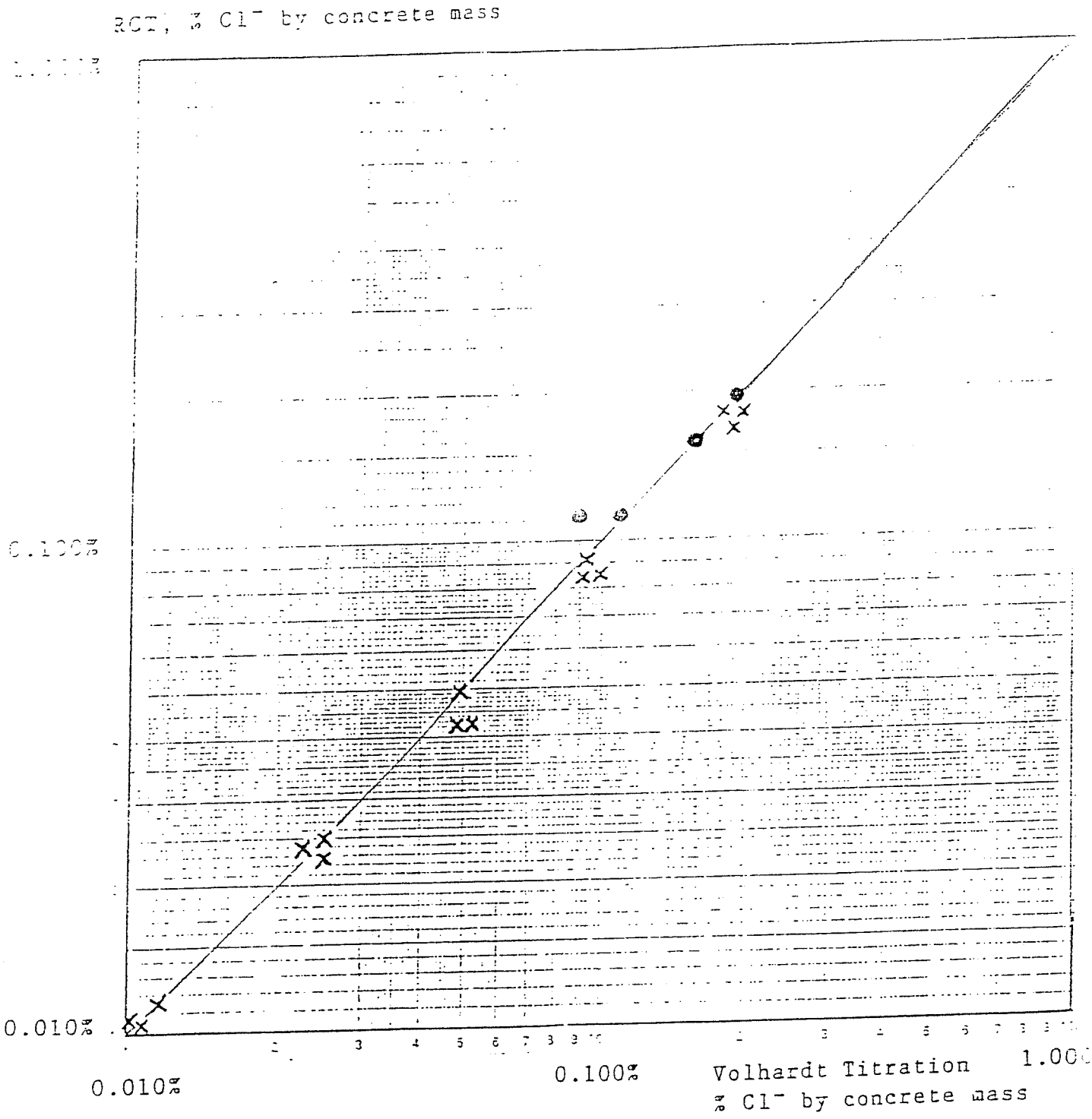
Courtesy of:

Danish Road Directorate (●), to Danish Standard
Swedish State Testing Institute (○), to Ion Chromatography
Norwegian Concrete Technology (●), to Norwegian Standard
Swedish Cement & Concrete Institute (○), to Swedish Standard
Danish Institute of Technology (✖), to Danish Standard

TROW GROUP LTD
Ontario, Canada

Correlation between RCT and ASTM C 114-8, hardened chloride exposed concrete

RCT	ASTM
% Cl^-/concrete mass	
0.004	0.005
0.008	0.009
0.010	0.009
0.012	0.015
0.015	0.013
0.016	0.015
0.018	0.017
0.018	0.020
0.021	0.020
0.022	0.025
0.028	0.031
0.028	0.026
0.034	0.034
0.044	0.041
0.052	0.055
0.052	0.049
0.053	0.055
0.101	0.120
0.105	0.110
0.110	0.109
0.130	0.121



Coutesy of:

X: Norwegian Concrete Technology, Oslo (NCT)

●: Cement och Betonginstitutet, Stockholm
(Swedish Cement and Concrete Research Institute)

Vejdirektoratet

Kloridbetinget korrosion

Undersøgelse af kloridbelastning og korrosion på brosøjler

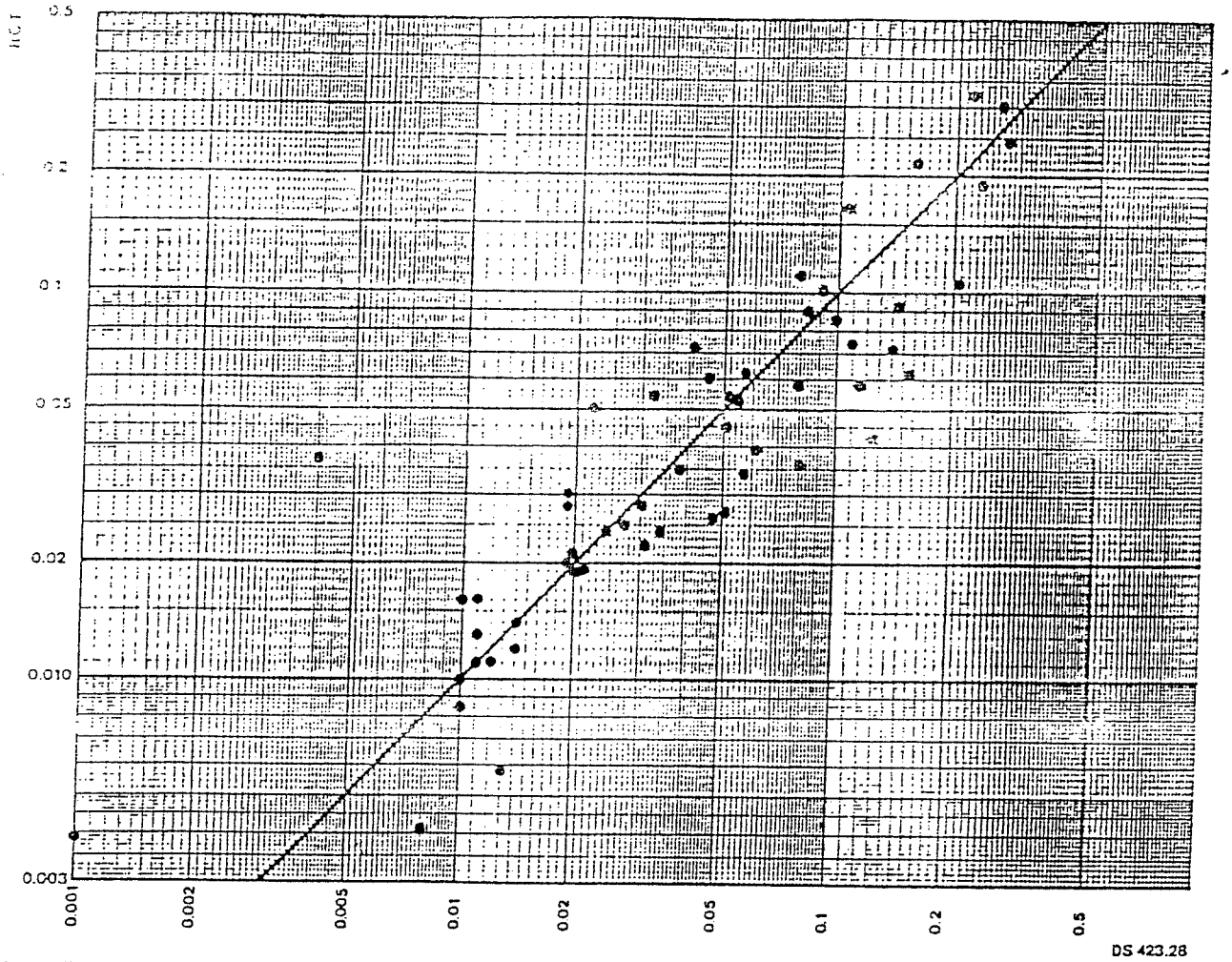
PRØVE	MÅLING VED RCT	MÅLING VED TITRERING
1	0,008	0
2	0,003	0
3	0,003	0
4	0,019	0,02
5	<0,003	0,003
6	0,09	0,11
7	0,012	0,01
8	0,007	0,01
9	0,048	0,05
10	0,008	0,01

FIGUR 3: Sammenligning af resultater af kloridmåling ved henholdsvis RCT-metoden og titrering.

BPS

vejledning: metoder til undersøgelse af betonkonstruktioner -altangange

BPS-publikation 56
juni 1987



Talværdierne angiver Cl^- indholdet, angivet i vægt % af betonvægten

Ved vurdering af tallene anvendes sædvanligvis følgende grænseværdier, idet SBI-værdierne er skønsmæssigt omregnet fra % af cementvægten.

Vurdering	SBI - Interval	TI - Interval *
Negligeabel	< 0.045	< 0.02
Korrosion mulig	0.045 - 0.11	0.02 - 0.05
Korrosion sandsynlig	0.11 - 0.25	0.05 - 0.15
Korrosion sikker	> 0.25	> 0.15

* jf. dokobeskrivelsen i afsnittet "chloridmålinger", side 21

MURSALTE

Kvalitativ og kvantitativ undersøgelse af salte i teglsten fra vestjyske middelalderkirker

BILAG B: Resultater fra grundstof- og ionanalyser.

BILAG C: Resultater fra kviksølvporøsimetri.

BILAG D: Sammenligning af to forskellige cloridmålinger.

Erik Stoklund Larsen

THE TECHNICAL UNIVERSITY OF DENMARK
DEPARTMENT OF CIVIL ENGINEERING
BUILDING MATERIALS LABORATORY

BILAG 3: SAMENLIGNING AF CLORIDMÅLINGER

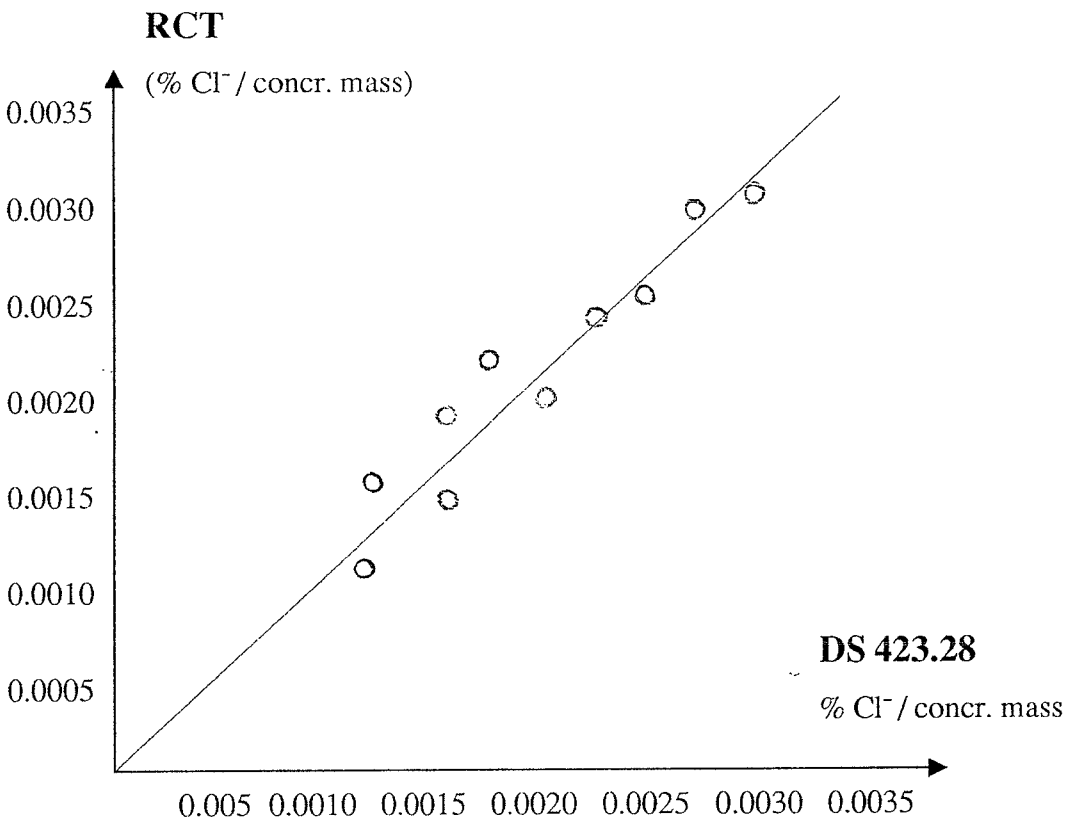
Germann: Måling af clorid ved Germann RCT-udstyr.
Autoanalyser: Måling af clorid ved autoanalyser
på Instituttet for Teknisk Hygiejne

(alle tal i vægtprocent)

Prøve	RCT Germann	Autoanalyser
odden	0,07	0,30
nb1	2,20	1,35
nb2	0,05	0,42
sb1	0,42	0,58
sb8	4,00	2,09
sb9	0,48	0,51
nn3	0,04	0,10
nn4	0,32	0,37
h2	0,06	0,04
h3	0,34	0,29
h4	0,25	0,20
o7	0,19	0,23
j1	0,21	0,35
j2	0,09	0,12
j3	0,60	0,55
j4	0,54	0,42
j5	0,85	0,89
j6	0,68	0,67
l1	0,95	1,11
a1	1,70	1,56
a2	0,56	0,55
a3	0,54	0,45
a4	0,48	0,43
a5	0,48	0,38
a6	0,44	0,41
a7	0,50	0,44
a8	0,56	0,49
a9	0,66	0,59
a10	2,80	2,07

Målingerne er afbildet grafisk på de to næste sider. Der ses fin overensstemmelse mellem de to forskellige målinger ved små clorid-koncentrationer. Ved højere koncentrationer måler Germann mere clorid end autoanalyser.

ESG (European Storebælt Group) correlation
between Danish Standard DS 423.28 and RCT
Measured on fresh concrete



PONTS et CHAUSSEES
Laboratoire d'essais des materiaux

RCTW: Rapid Chloride Test Water-soluble, on-site
RCTA: Rapid Chloride Test Acid-soluble, on-site
RCTS: Rapid Chloride Test Acid-soluble, made in the laboratory **N° 3105/5**
Titration: Standard Titration, made in the laboratory

FEUILLE D'ANALYSE

Echantillon: 56 poussières de forage **Chantier**: PS4
Reçu le: 31.1.96 **Remis par**: Soupro **Analyses à faire**: Etude chlorure

RCT1 culée PO

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% beton	% ciment	% béton	% ciment
0-15mm	0.081	0.53	0.109	0.71	0.094	0.61	0.154	1.00
15-30mm	0.083	0.54	0.069	0.45	0.062	0.40	0.070	0.46
30-50mm	0.026	0.17	0.042	0.27	0.056	0.36	0.035	0.23
50-70mm	0.025	0.16	0.031	0.20	0.04	0.26	0.047	0.31

RCT2 culée PO

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.012	0.08	0.02	0.13	0.027	0.18	0.024	0.16
15-30mm	0.006	0.04	0.01	0.07	0.011	0.07	0.012	0.08
30-50mm	0.005	0.03	0.007	0.05	0.005	0.03	0.0	0
50-70mm	0.004	0.03	0.005	0.03	0.004	0.03	0.0	0

6

RCT3 culée PO

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.025	0.16	0.069	0.45	0.089	0.58	0.059	0.38
15-30mm	0.011	0.07	0.019	0.12	0.029	0.19	0.024	0.16
30-50mm	0.006	0.04	0.003	0.02	0.002	0.01	0.012	0.08
50-70mm	0.006	0.04	0.009	0.06	0.002	0.01	0.012	0.08

RCT4 culée PO

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.027	0.18	0.054	0.35	0.089	0.58	0.083	0.54
15-30mm	0.026	0.18	0.052	0.34	0.072	0.47	0.047	0.30
30-50mm	0.016	0.10	0.025	0.16	0.038	0.25	0.012	0.08
50-70mm	0.011	0.07	0.015	0.10	0.025	0.16	0	0

RCT5 culée PO

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.005	0.03	0.015	0.10	0.006	0.04	0	0
15-30mm	0.005	0.03	0.013	0.08	0.006	0.04	0	0
30-50mm	0.005	0.03	0.006	0.04	0.005	0.03	0	0
50-70mm	0.004	0.03	0.006	0.04	0.004	0.03	0	0

RCT6 Pilier 1

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.031	0.20	0.051	0.33	0.055	0.36	0.059	0.38
15-30mm	0.018	0.12	0.022	0.14	0.022	0.14	0.012	0.08
30-50mm	0.006	0.04	0.011	0.07	0.007	0.05	0	0
50-70mm	0.005	0.03	0.005	0.03	0.005	0.03	0	0

RCT7 Pilier 2

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.027	0.18	0.059	0.38	0.11	0.72	0.106	0.69
15-30mm	0.020	0.13	0.027	0.18	0.082	0.53	0.071	0.46
30-50mm	0.014	0.09	0.023	0.15	0.056	0.36	0.047	0.31
50-70mm	0.015	0.010	0.022	0.14	0.033	0.21	0.035	0.23

RCT8 culée P4

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.085	0.55	0.16	1.04	0.164	1.07	0.200	1.3
15-30mm	0.071	0.46	0.15	0.98	0.138	0.90	0.177	1.15
30-50mm	0.069	0.45	0.12	0.78	0.105	0.68	0.154	1.00
50-70mm	0.068	0.44	0.11	0.72	0.098	0.64	0.130	0.85

C

RCT12 culée P4

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.013	0.09	0.021	0.14	0.041	0.27	0.031	0.20
15-30mm	0.009	0.06	0.015	0.10	0.027	0.18	0.013	0.08
30-50mm	0.013	0.09	0.011	0.07	0.021	0.14	0.022	0.14
50-70mm	0 007	0.05	0.016	0.10	0.019	0.12	0 014	0.09

RCT13 pilier 6

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.002	0.01	0.004	0.04	0.008	0.05	0.005	0.03
15-30mm	0.003	0.01	0.005	0.03	0.005	0.03	0.005	0.03
30-50mm	0.001	0.01	0.003	0.02	0.003	0.02	0.003	0.02
50-70mm	0.00	0	0	0	0.001	0.0	0	0

RCT14 pilier 5

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.020	0.13	0.040	0.26	0.030	0 20	0.025	0.16
15-30mm	0.009	0.06	0.018	0.12	0.010	0.07	0.010	0.07
30-50mm	0.007	0.05	0.011	0.07	0.012	0.08	0 010	0.07
50-70mm	0.006	0.04	0.007	0.05	0.006	0.04	0	0

* Les valeurs sont calculées à base d'une teneur en ciment de 350 kg/m3

Expédié à. Soupro

N° 3105/5

RCT9 culée P4

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.039	0.25	0.071	0.46	0.135	0.89	0.106	0.67
15-30mm	0.018	0.12	0.03	0.20	0.095	0.62	0.083	0.54
30-50mm	0.010	0.07	0.016	0.10	0.068	0.44	0.059	0.38
50-70mm	0.010	0.07	0.015	0.10	0.33	0.21	0.024	0.16

RCT11 culée P4

Echantillons	RCTW *		RCTA *		RCTS *		Titration *	
	%béton	% ciment	% béton	% ciment	% béton	% ciment	% béton	% ciment
0-15mm	0.040	0.26	0.058	0.38	0.061	0.40	0.058	0.38
15-30mm	0.032	0.21	0.050	0.33	0.054	0.35	0.048	0.31
30-50mm	0.022	0.14	0.029	0.19	0.021	0.14	0.015	0.10
50-70mm	0.013	0.08	0.020	0.13	0.025	0.16	0.025	0.16

Rate Of Chloride Ingress In Mortar

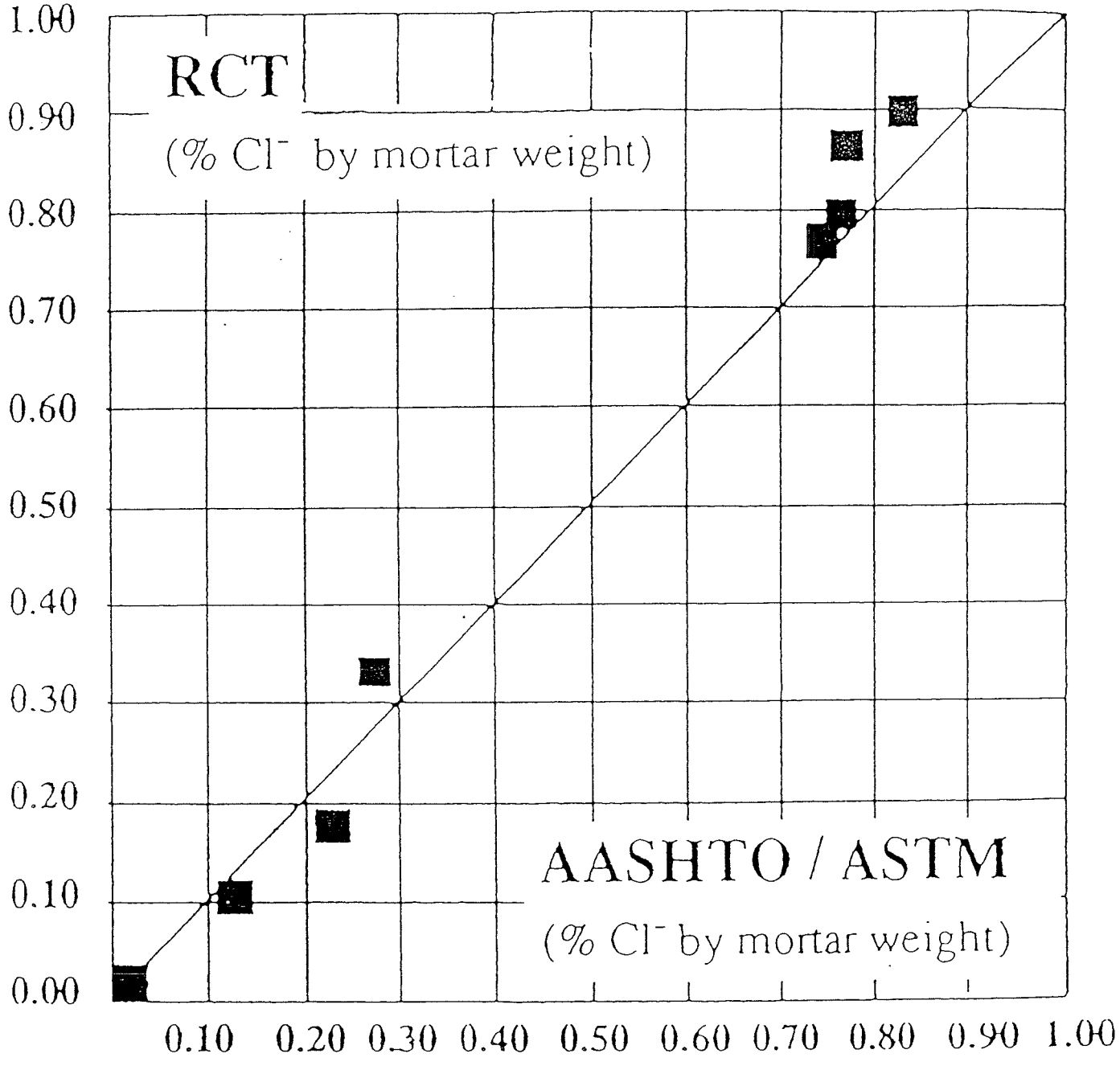
To incorporate chloride into the mortar specimens, it was decided to use chloride solution ponding on the cured and dried specimens instead of initially mixing the chloride with the mortar. With ponding, the chloride is introduced into the mortar matrix by a process of diffusion which simulates a real life situation. Theoretical calculations were made to estimate the solution concentration that would be required to achieve a certain level of chloride in the mortar (based on weight percent mortar). These calculations were based on replacing the evaporable water in the mortar specimens with the chloride ponding solution.

Chloride concentrations in the test samples were determined with a portable test kit manufactured by Germann Instruments. The portable kit was chosen because it is very convenient to use and is much less time consuming than the standard AASHTO/ASTM laboratory test method. The accuracy of the test kit is well established and was further confirmed during this project by conducting parallel analysis using the method developed by SHRP. The comparative results given in table 2 for eight different mortar samples, clearly show that there is very good correlation between the Germann and the SHRP methods.

Table 2. Comparison of SHRP and Germann methods of chloride analysis.

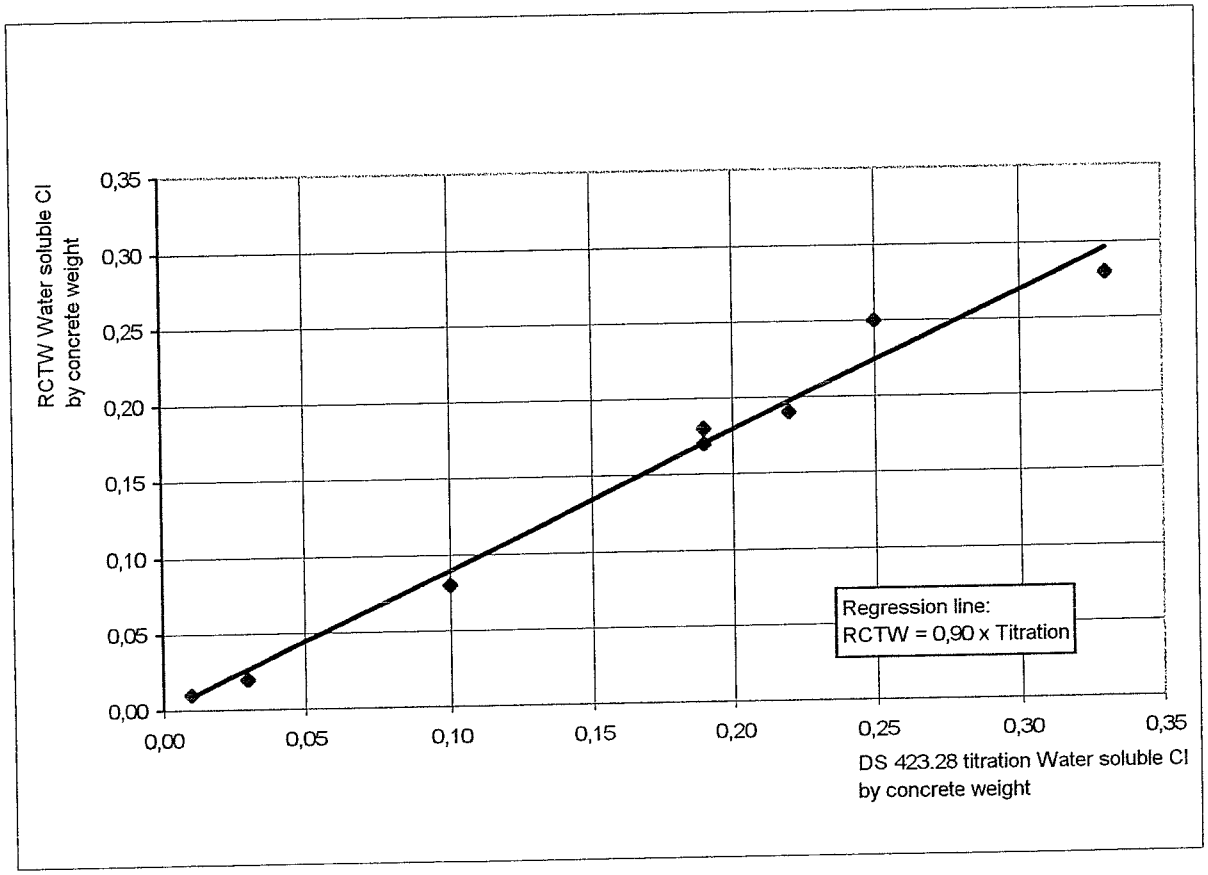
Sample No.	% Chloride	
	SHRP Method*	Germann Method
1	0.23	0.19
2	0.11	0.12
3	0.28	0.34
4	0.77	0.88
5	0.82	0.91
6	0.74	0.78
7	0.00	0.00
8	0.74	0.80

* Standard solutions of 1.25, 0.60, 0.30, 0.03, and 0.01 percent were used to calibrate probe.


RCT
(% Cl⁻ by mortar weight)
AASHTO / ASTM
(% Cl⁻ by mortar weight)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00

Water soluble chlorides on powder drilled out on seastructure piers. The Danish Road Directorate, 1997.
Comparison between RCTW and DS 423.28 Titration.

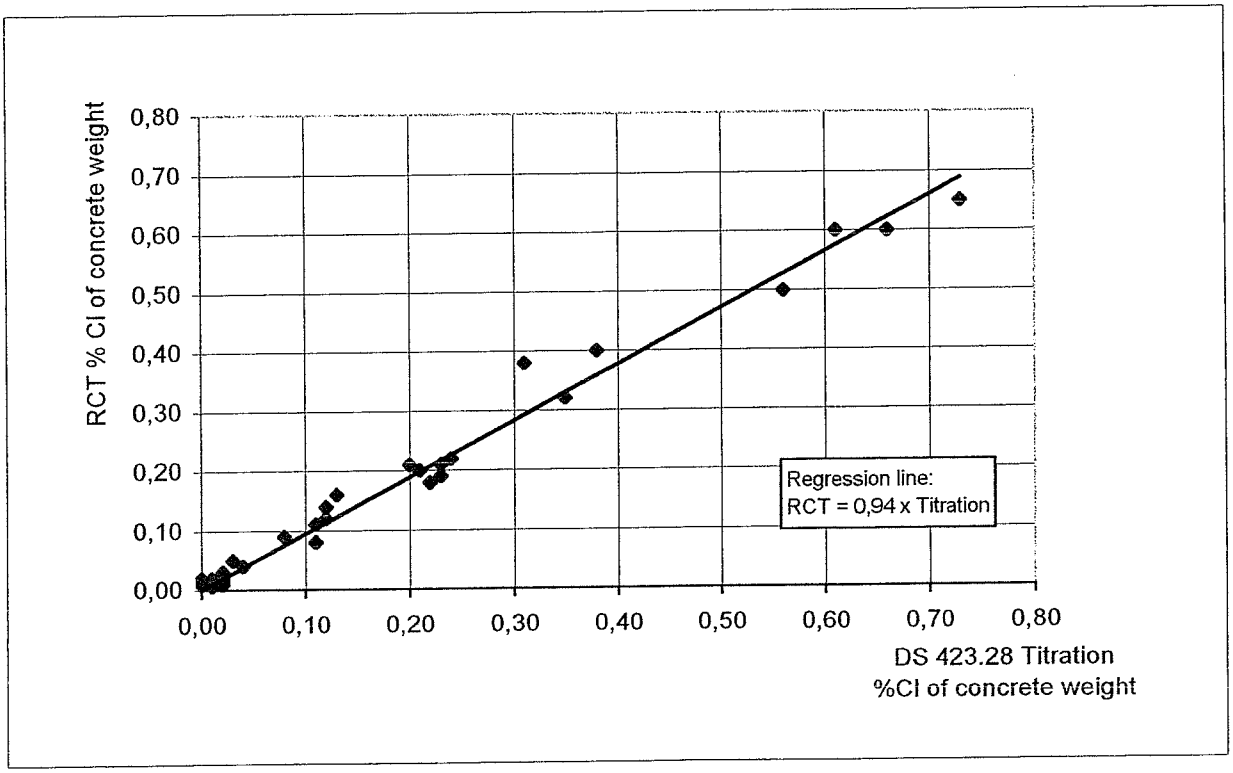
RCTW % water soluble Cl	DS 423.28 % water soluble Cl
0,010	0,010
0,030	0,020
0,100	0,080
0,190	0,170
0,220	0,190
0,330	0,280
0,250	0,250
0,190	0,180



Comparison between standard titration DS 423.28 and RCT measured on drilled out dust from danish bridges.
The percentage of chlorides are given in relation to the concrete weight.

DS423.28 Titration %	RCT %
0,230	0,190
0,120	0,120
0,030	0,050
0,000	0,010
0,560	0,500
0,120	0,140
0,030	0,050
0,000	0,020
0,240	0,220
0,130	0,160
0,110	0,080
0,010	0,007
0,020	0,017
0,350	0,320
0,230	0,210
0,120	0,120
0,040	0,040
0,010	0,010
0,730	0,650
0,380	0,400
0,310	0,380
0,110	0,110
0,020	0,030

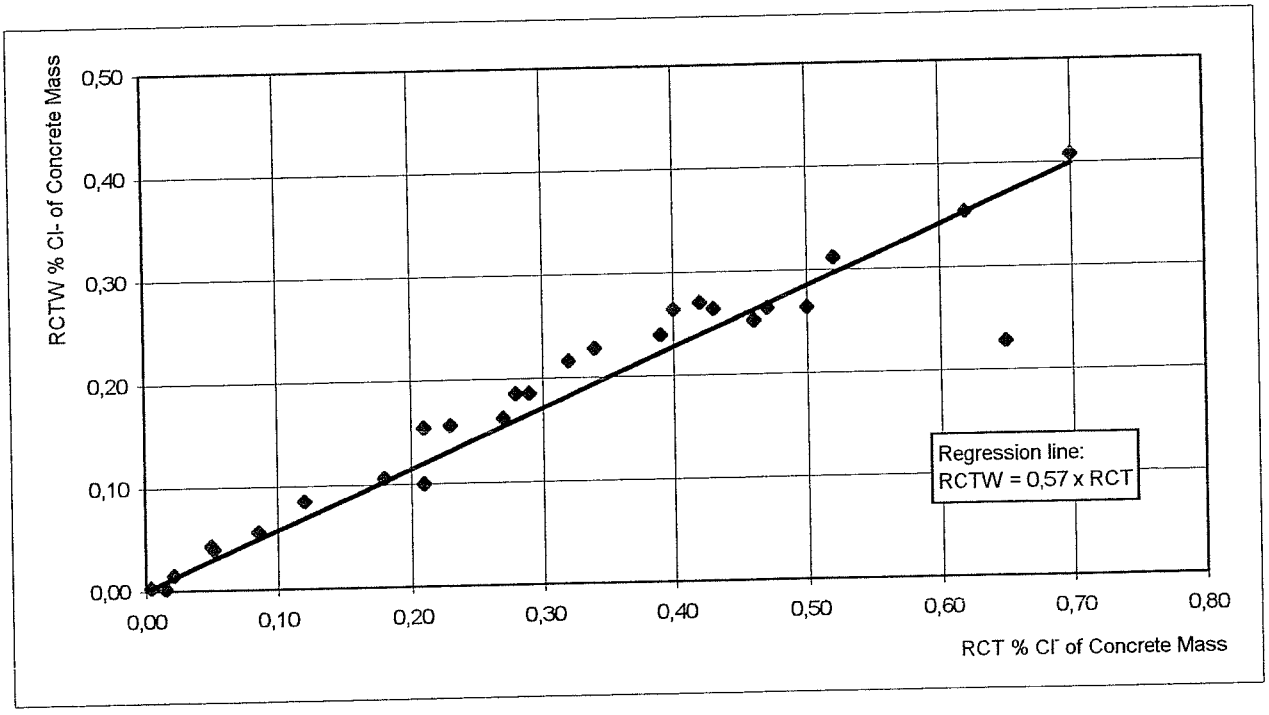
DS423.28 Titration %	RCT %
0,260	0,220
0,100	0,100
0,040	0,100
0,010	0,040
0,020	0,020
0,610	0,020
0,080	0,600
0,010	0,090
0,010	0,010
0,010	0,010
0,210	0,200
0,020	0,010
0,020	0,010
0,220	0,180
0,010	0,010
0,000	0,010
0,000	0,010
0,010	0,010
0,660	0,600
0,200	0,210
0,030	0,050
0,010	0,010
0,010	0,010



Comparison between RCT (acid soluble) and RCTW (water soluble) chloride content.

Swedish sea-wall; TL, loc. 3-40 P2, 2-40 P2, HB P2

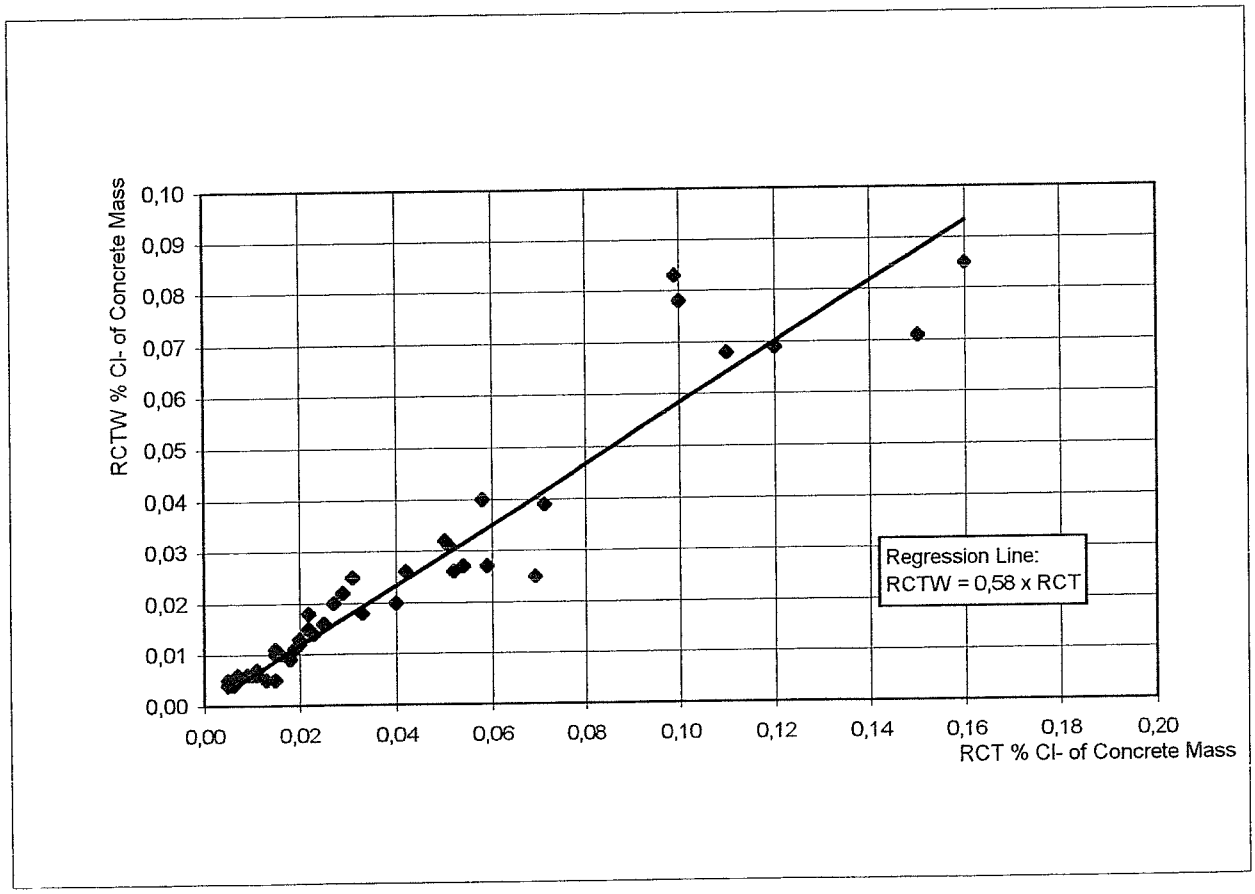
RCT %	RCTW %
0,400	0,264
0,270	0,162
0,210	0,100
0,180	0,106
0,086	0,056
0,021	0,015
0,004	0,003
0,650	0,228
0,700	0,408
0,500	0,264
0,430	0,264
0,470	0,264
0,460	0,252
0,340	0,228
0,280	0,186
0,210	0,154
0,120	0,085
0,052	0,040
0,004	0,003
0,620	0,354
0,520	0,312
0,420	0,270
0,390	0,240
0,320	0,216
0,290	0,186
0,230	0,156
0,050	0,043
0,015	0,002
0,004	0,003



Comparison between RCT (acid soluble) and RCTW (water soluble) chloride content.

Blast furnace slag concrete, bridge slabs & columns

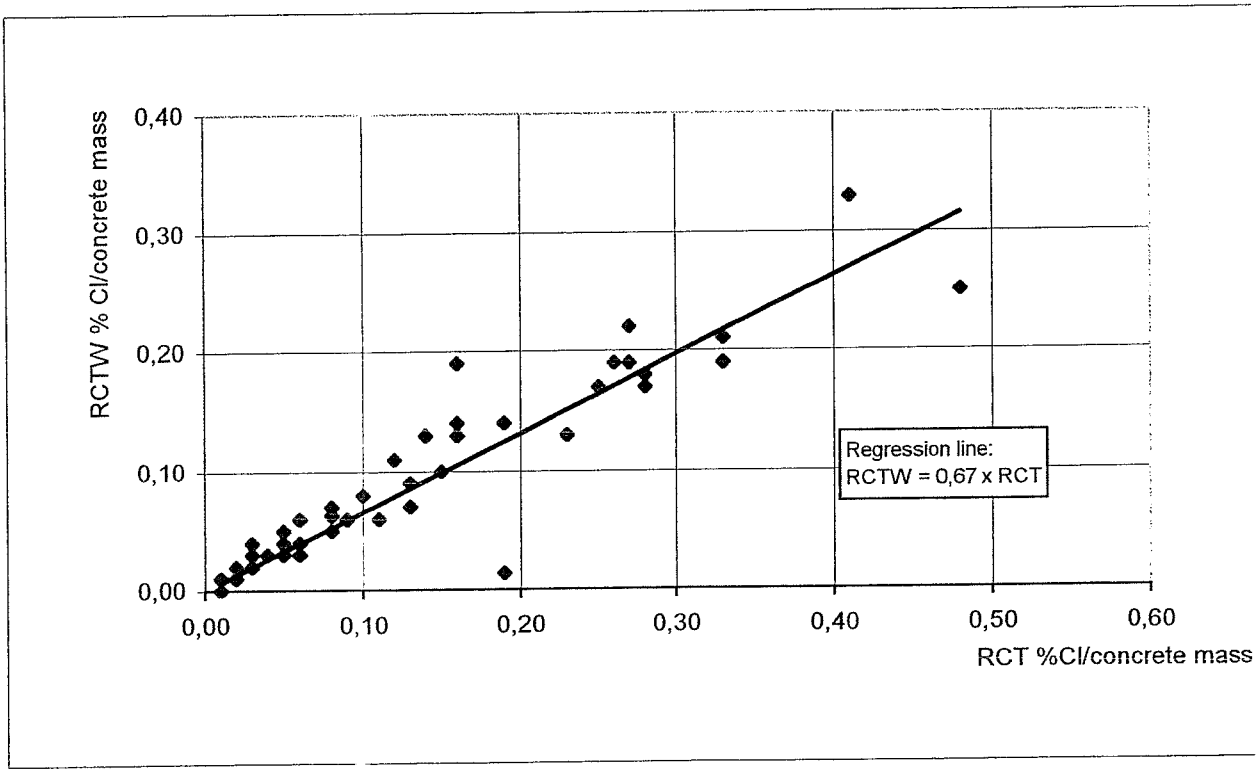
RCT %	RCTW %	RCT %	RCTW %
0,020	0,013	0,022	0,018
0,029	0,022	0,051	0,031
0,050	0,032	0,006	0,004
0,058	0,040	0,006	0,005
0,015	0,010	0,013	0,005
0,016	0,010	0,015	0,005
0,033	0,018	0,015	0,011
0,071	0,039	0,025	0,016
0,007	0,006	0,052	0,026
0,011	0,007	0,054	0,027
0,018	0,009	0,009	0,006
0,040	0,020	0,010	0,006
0,110	0,068	0,019	0,011
0,120	0,069	0,069	0,025
0,150	0,071	0,005	0,004
0,160	0,085	0,007	0,005
0,022	0,015	0,010	0,006
0,023	0,014	0,020	0,012
0,027	0,020	0,031	0,025
0,059	0,027	0,042	0,026
0,005	0,005	0,099	0,083
0,011	0,006	0,100	0,078



RCT (acid soluble chlorides) compared to RCTW (water soluble chlorides) from powder drilled out of on pier shafts of bridge VS, Danish Road Directorate, 1997.

RCT %	RCTW %
0,330	0,190
0,480	0,250
0,410	0,330
0,250	0,170
0,090	0,060
0,160	0,140
0,120	0,110
0,060	0,060
0,030	0,040
0,020	0,020
0,050	0,050
0,280	0,170
0,260	0,190
0,190	0,140
0,090	0,060
0,160	0,190
0,100	0,080
0,050	0,040
0,040	0,030
0,020	0,020
0,130	0,070
0,330	0,210
0,190	0,014
0,060	0,030
0,010	0,010

RCT %	RCTW %
0,280	0,180
0,230	0,130
0,110	0,060
0,050	0,030
0,020	0,010
0,270	0,220
0,270	0,190
0,150	0,100
0,050	0,030
0,010	0,010
0,010	0,000
0,010	0,000
0,080	0,050
0,080	0,070
0,030	0,030
0,140	0,130
0,100	0,080
0,030	0,030
0,010	0,010
0,010	0,000
0,160	0,130
0,130	0,090
0,080	0,063
0,060	0,040
0,030	0,020



Comparison between RCT (Acid soluble) and RCTW (water soluble) chloride.
Danish coast bridges SSB, HH, STB, KVB
Powder drilled out at 0-15, 15-30, 30-60, 60-90 and 90-120 mm depth.
Percentage of chlorides related to concrete weight.

RCT %	RCTW%
0,500	0,400
0,210	0,140
0,050	0,020
0,010	0,010
0,010	0,010
0,180	0,110
0,010	0,010
0,010	0,005
0,010	0,005
0,010	0,000
0,500	0,420
0,090	0,040
0,010	0,010
0,010	0,005
0,010	0,000
0,220	0,170
0,100	0,060
0,040	0,020
0,020	0,010
0,020	0,010

RCT %	RCTW%
0,700	0,500
0,400	0,240
0,380	0,190
0,110	0,060
0,030	0,010
0,320	0,200
0,210	0,120
0,120	0,060
0,040	0,020
0,010	0,010
0,240	0,160
0,160	0,008
0,080	0,040
0,070	0,050
0,020	0,010
0,560	0,440
0,230	0,160
0,140	0,080
0,050	0,020
0,020	0,010