

**MILJØSTYRELSENS  
REFERENCELABORATORIUM  
FOR STØJMÅLINGER**

Udøvende institution:  
DELTA Dansk Elektronik, Lys & Akustik

**19. sammenlignende støjmåling**

Jens E. Laursen

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**19. sammenlignende støjmåling**

**Opgave A - ekstern støj fra vaskehal**

**Opgave B - toneanalyse af én tone**

**Opgave C - Nord2000 beregninger af vejstøj  
(delvis obligatorisk)**

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**Opgave A – støj fra vaskehal**



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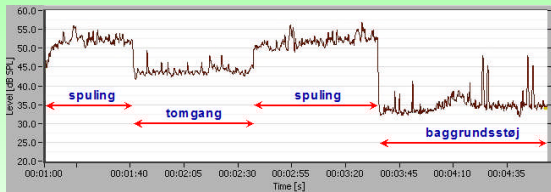
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## Opgave A – støj fra vaskemal



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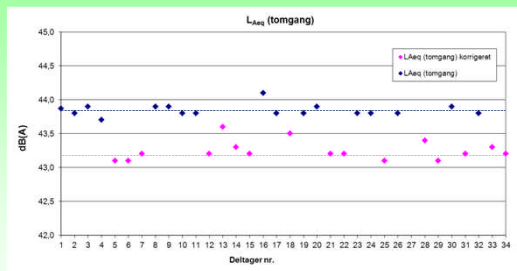
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## $L_{Aeq}$ (tomgang)



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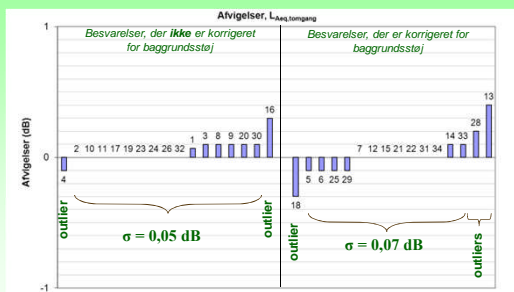
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## Afvielser : $L_{Aeq}$ (tomgang)



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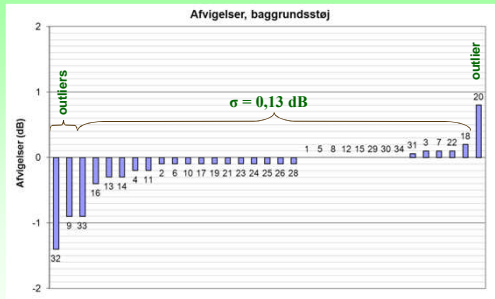
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## Afvielser : $L_{Aeq}$ (baggrundsstøj)



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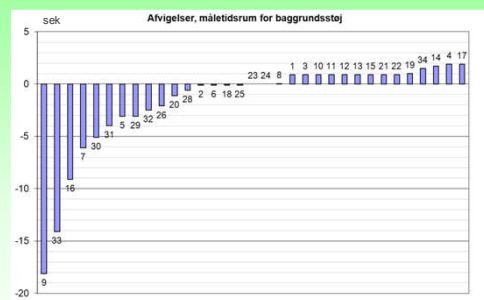
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## Afvielser : Måletidsrum



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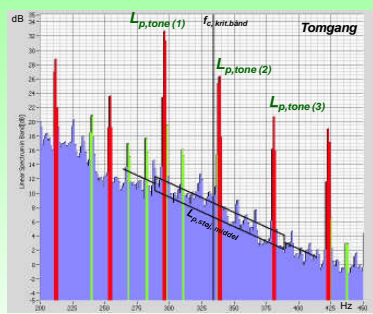
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## Toneanalyse



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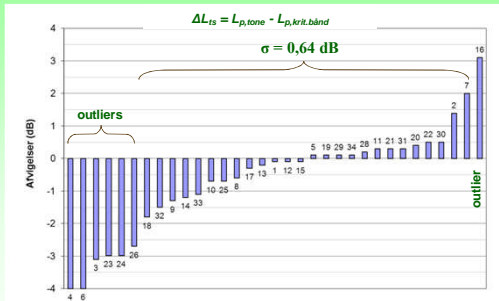
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## Afvielser : $\Delta L_{ts}$



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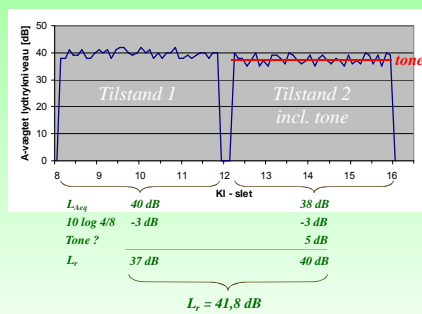
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## Varighed - eksempel på 2 driftstilstande



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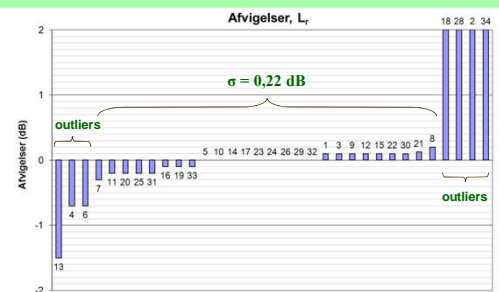
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## Afvielser : $L_T$



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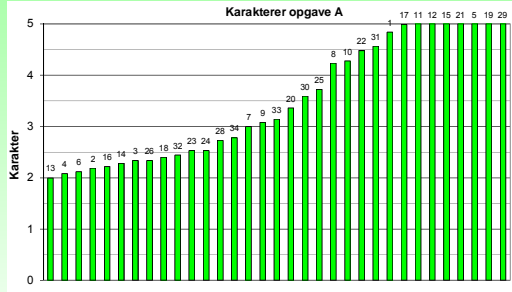
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## Karakterer for Opgave A



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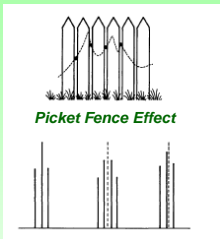
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## Opgave B



Picket Fence effekten er fx beskrevet i Brüel & Kjær Technical Review 1987 nr. 4 samt i Orientering nr. 13 fra Referencelaboratoriet.

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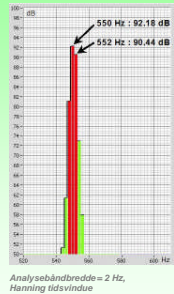
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## Opgave B



Fra grafen :  $\Delta L = 92,18 - 90,44 = 1,74$  dB

Fra orientering nr. 13, Tabel A-1 approksimeret, idet  $x = \Delta L$  dB

$$\Delta L = 0,042x^2 - 0,4868x + 1,4162$$

$$\Delta f_c = -0,0835x + 0,4965$$

$$\Delta L(x=1,74) = 0,70 \text{ dB} \Rightarrow L_p = 92,18 \text{ dB} + 0,70 \text{ dB} = 92,88 \text{ dB}$$

$$\Delta f_c(x=1,74) = 0,35 \text{ Hz} \Rightarrow f_c = 550 \text{ Hz} + 0,35 \text{ Hz} = 550,35 \text{ Hz}$$

(Den sande værdi er fundet til  $L_p = 92,9$  dB og  $f_c = 550,7$  Hz)

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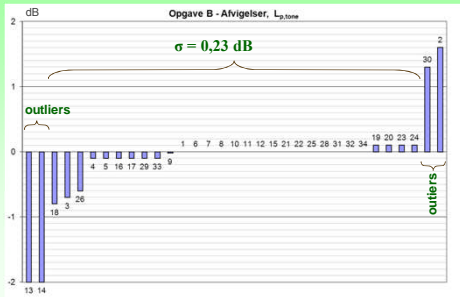
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## Opgave B. Afvigelser : $L_{p, \text{tone}}$



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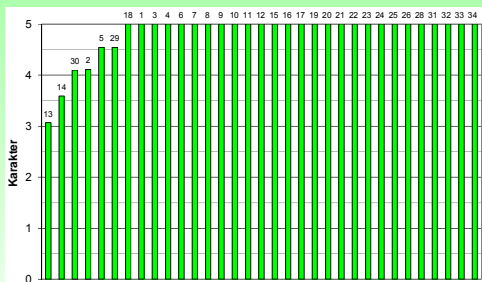
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## Karakterer for Opgave B



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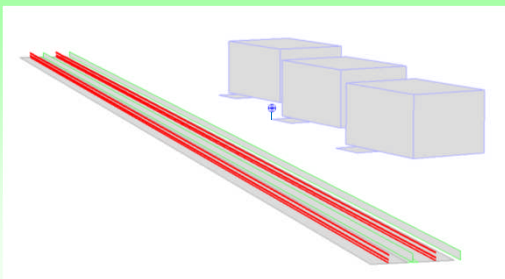
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## Opgave C



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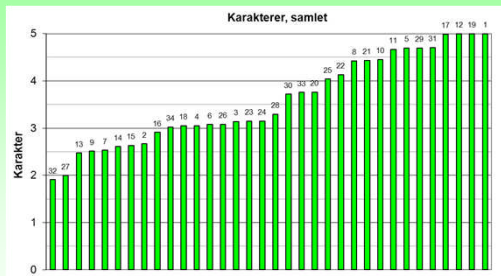
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## Samlet karakter for 19. saml. støjmåling



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## Resultater af 19. saml

$L_{Aeq}$  : Standardafvigelsen,  $\sigma = 0,05 - 0,13$  dB uden outliers  
(MST vejl. 5/1984 angiver instrumentbetinget usikkerhed til  $\sigma_{inst} = 0,25 - 0,50$  dB)

$L_{den}$  : Standardafvigelsen,  $\sigma = 0,41$  dB, uden outliers  
(I den 17. sammenlignende støjmåling var  $\sigma = 0,09$  dB, uden outliers)

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## Resultater, sammenligning

Usikkerhed, $\sigma$	16. saml. (2006)	19. saml. (2011)
$L_{Aeq}$	0,09 - 0,27 dB	0,07 - 0,13 dB
Antal toner	1	3
$L_{p, tone}$	0,2 dB	0,4 dB
$L_{p, krit. bånd}$	1,0 dB	0,5 dB
$\Delta L_{IS}$	0,6 dB	0,4 dB

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**Spørgsmål ?**

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