



# ***Setting Contractual Performance Specifications for Odour Control Equipment***

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## ***Two types of performance guarantees:***

- ❖ Percent removal:

90 % removal of odour

- ❖ Maximum system outlet allowed:

200 "odour units per cubic meter"

# ***Setting a Performance Standard***

- ✓ Standard development from Policy making
- ✓ Collaboration (input) from all Stakeholders
- ✓ Standard is transparent – open for review

# ***Setting a Performance Standard***

- ✓ Is the Standard valid ? Can its validity be tested ?
- ✓ Is the Standard referenced to a regulatory standard or industry standard ?
- ✓ Is the Standard achievable ?

# ***Key elements of a performance standard***

- Sampling protocols
  - ★ multiple times?
  - ★ multiple samples?
- Clear performance measure
- Setting cut-score
  - ★ bright line?
  - ★ arbitrary?
  - ★ developed from good information?
- Are consequences and remedies provided?

## ***Key elements of a performance standard***

- Is probable error acknowledged ?
- Is sampling bias acknowledged ?
- Is precision & accuracy variance included ?

## Question #1

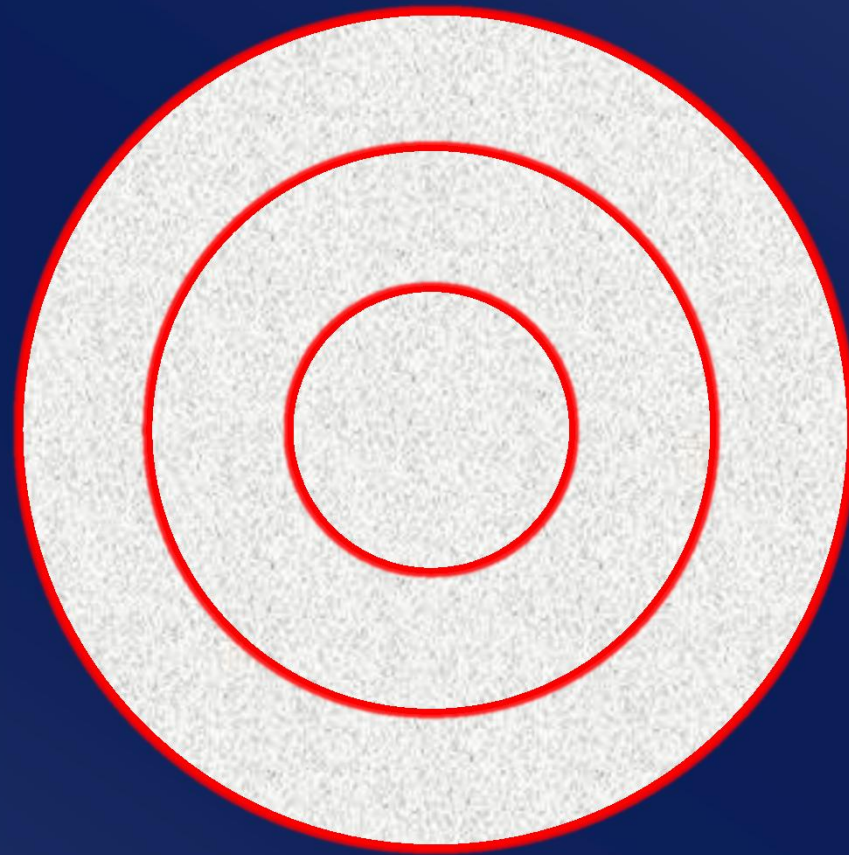
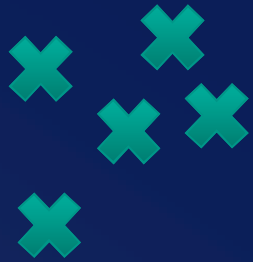
What is the Precision and Accuracy  
of Odour Testing for  
Odour Control Systems ?

## Question #2

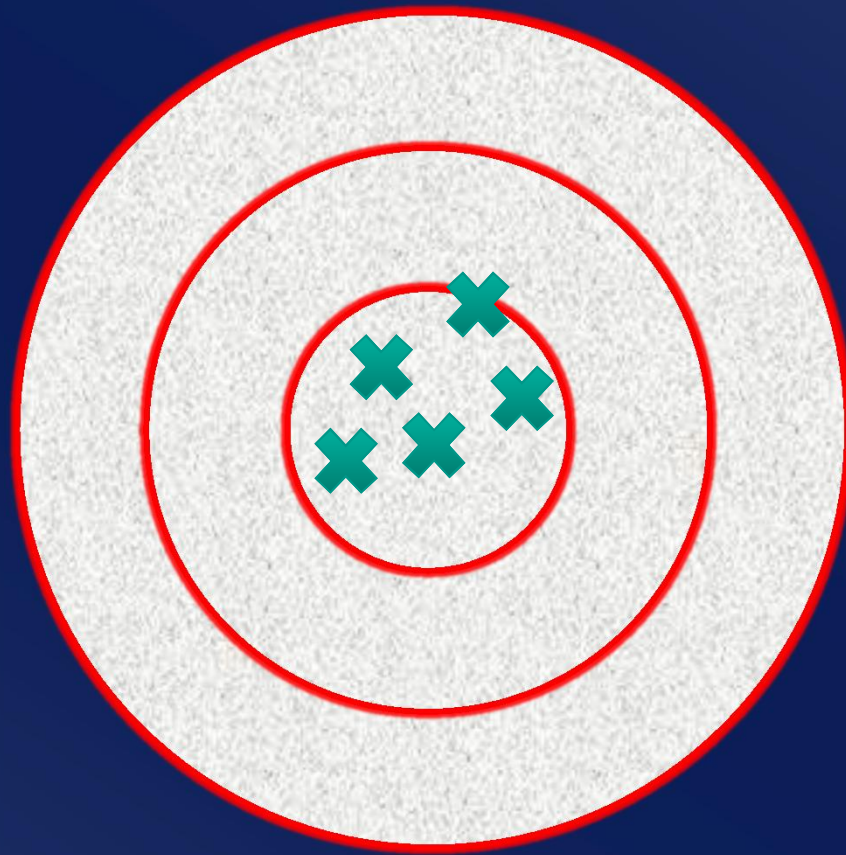
How do we know  
if an odour control system  
passes a performance test ?



# Precision



# Precision and Accuracy



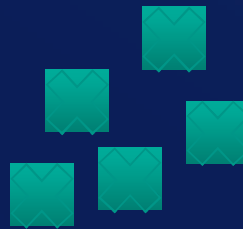
# This is Odour Testing

Precise ?



# This is Odour Testing

More Precise !



# What about Odour Testing Accuracy ?



# *EN 13725:2003*

Committee for European Normalization (CEN)

Created a framework for qualifying:

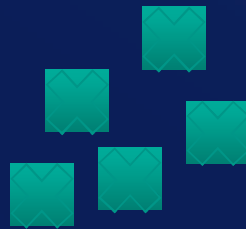
- ✓ Odour Assessors
- ✓ Odour Panels

Standard odorant: 1-butanol (n-butanol)

## **EN 13725**

*“The odour laboratory’s precision and accuracy to n-butanol, the standard odorant, is transferable to all environmental odour samples tested by the laboratory.”*

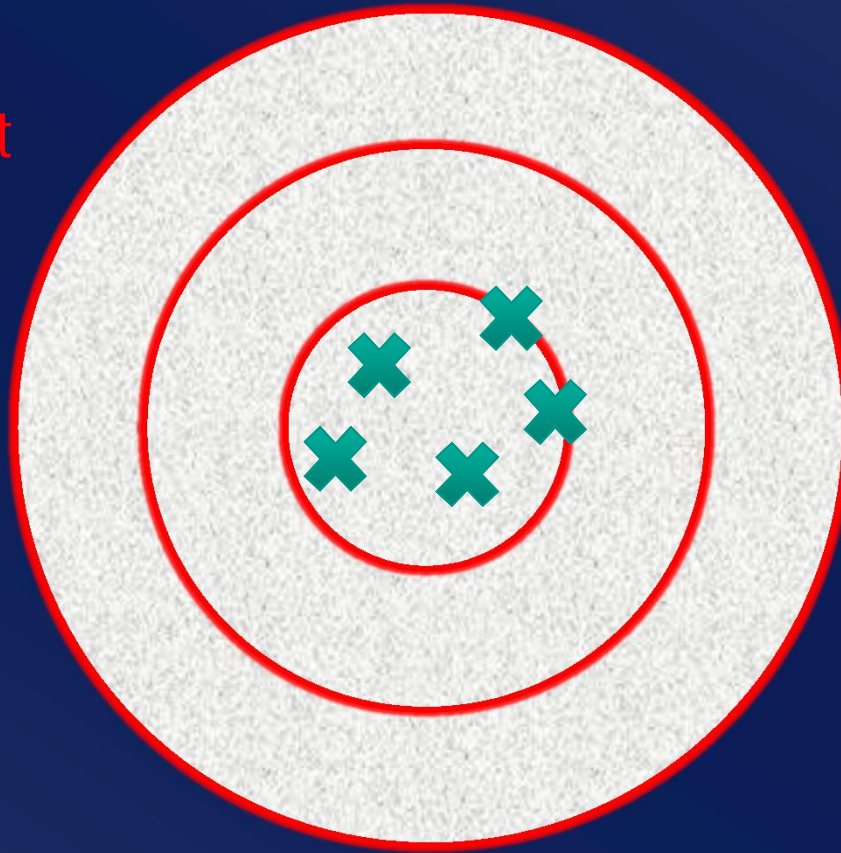
This is Odour Testing before EN13725:2003



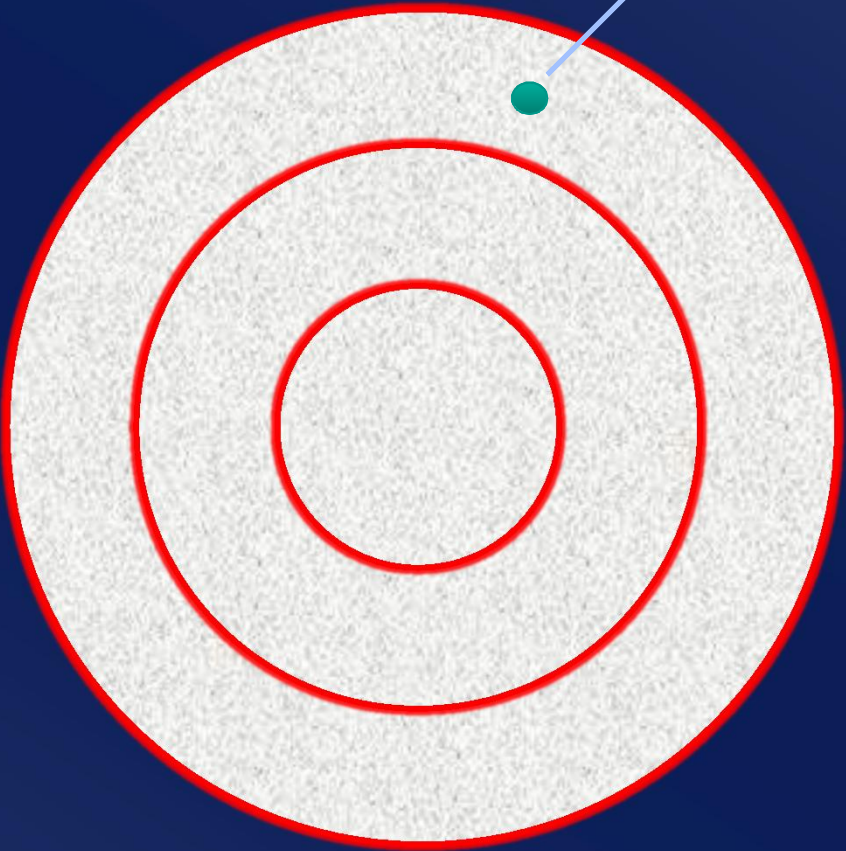


# This is Odour Testing with EN13725:2003

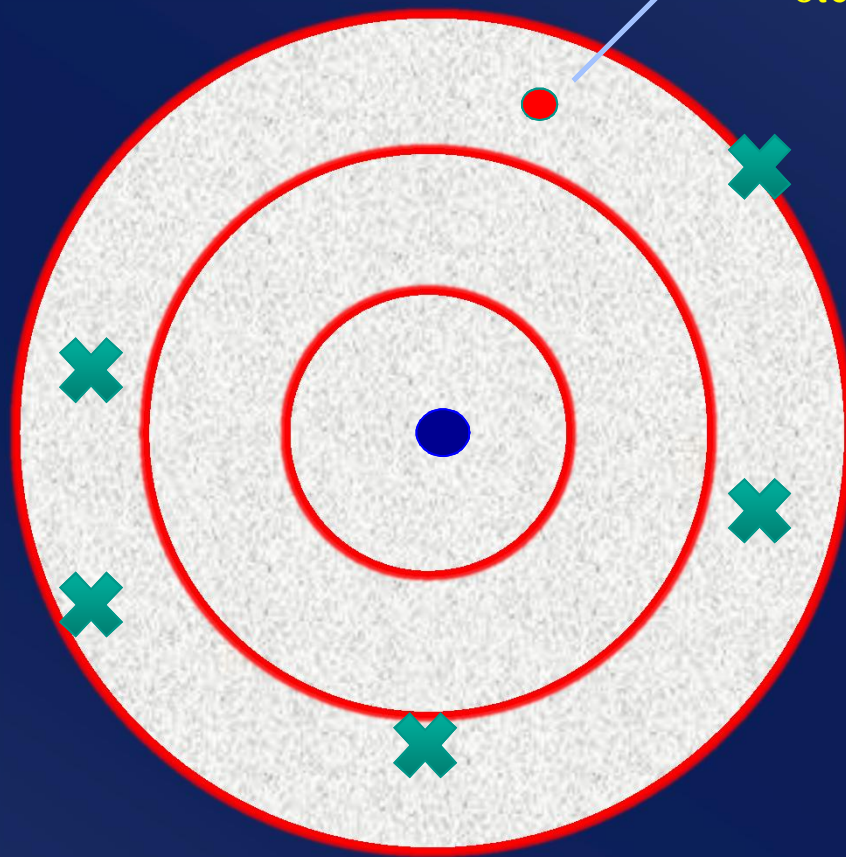
n-butanol Testing  
creates the Target



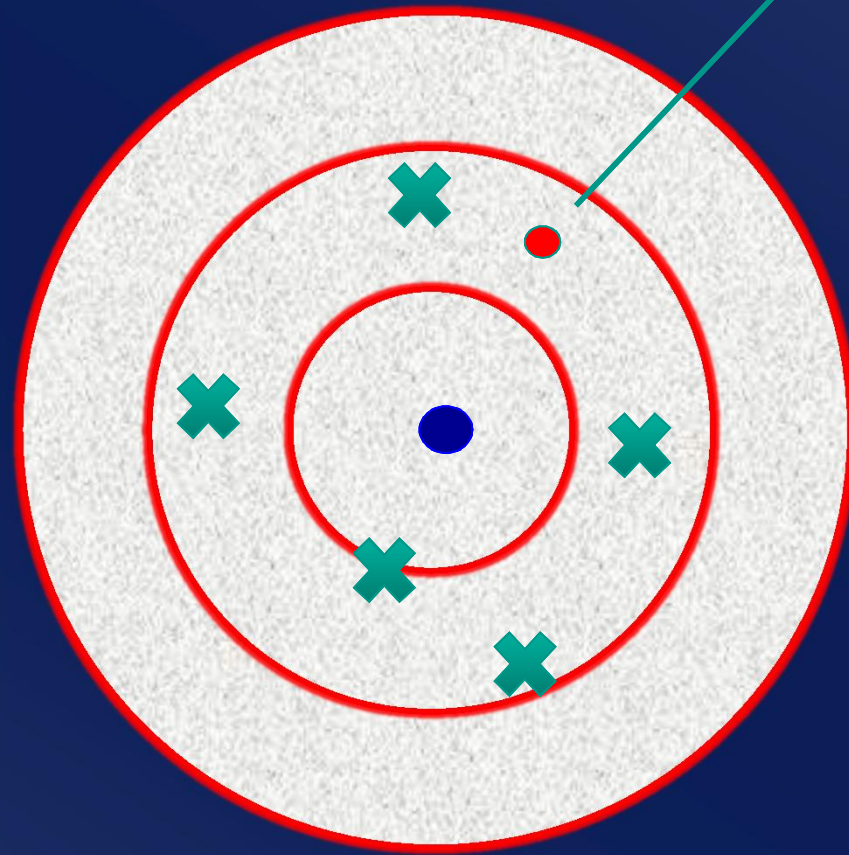
EN13725 Minimum



EN13725 Minimum  
std. dev. 0.172

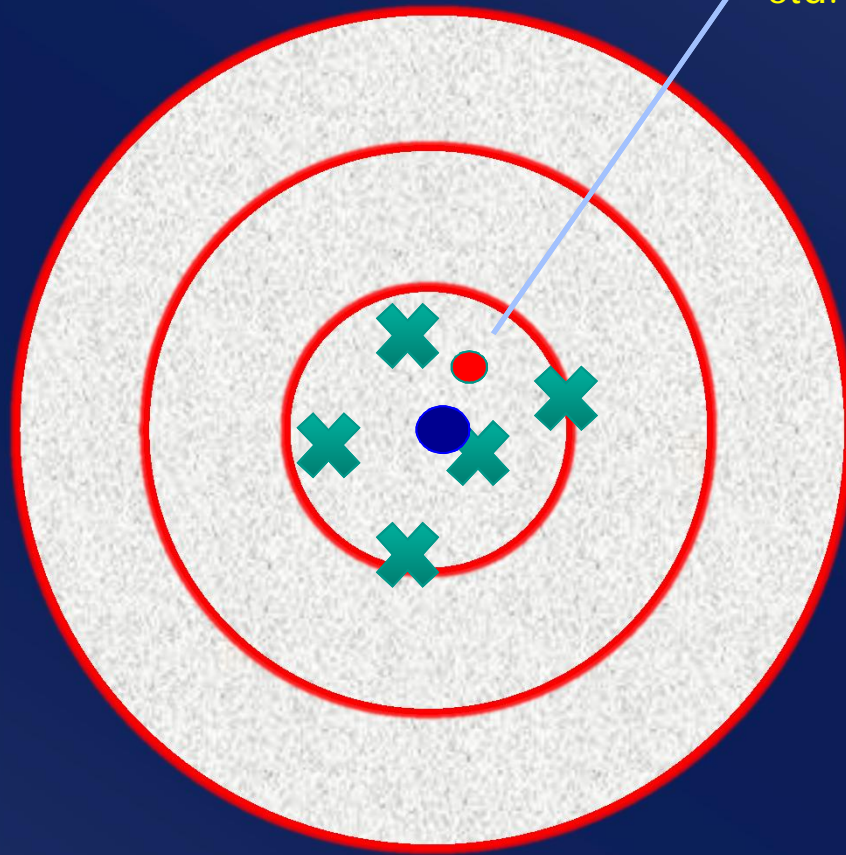


Inter-Panel  
std. dev. 0.10

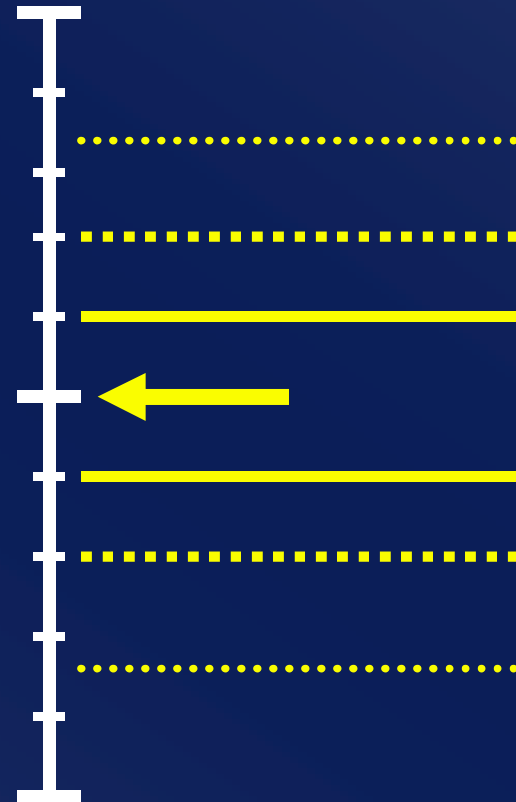


Within Panel

std. dev. 0.05



# How to set a performance test requirement?



# ***Percent Removal – example***

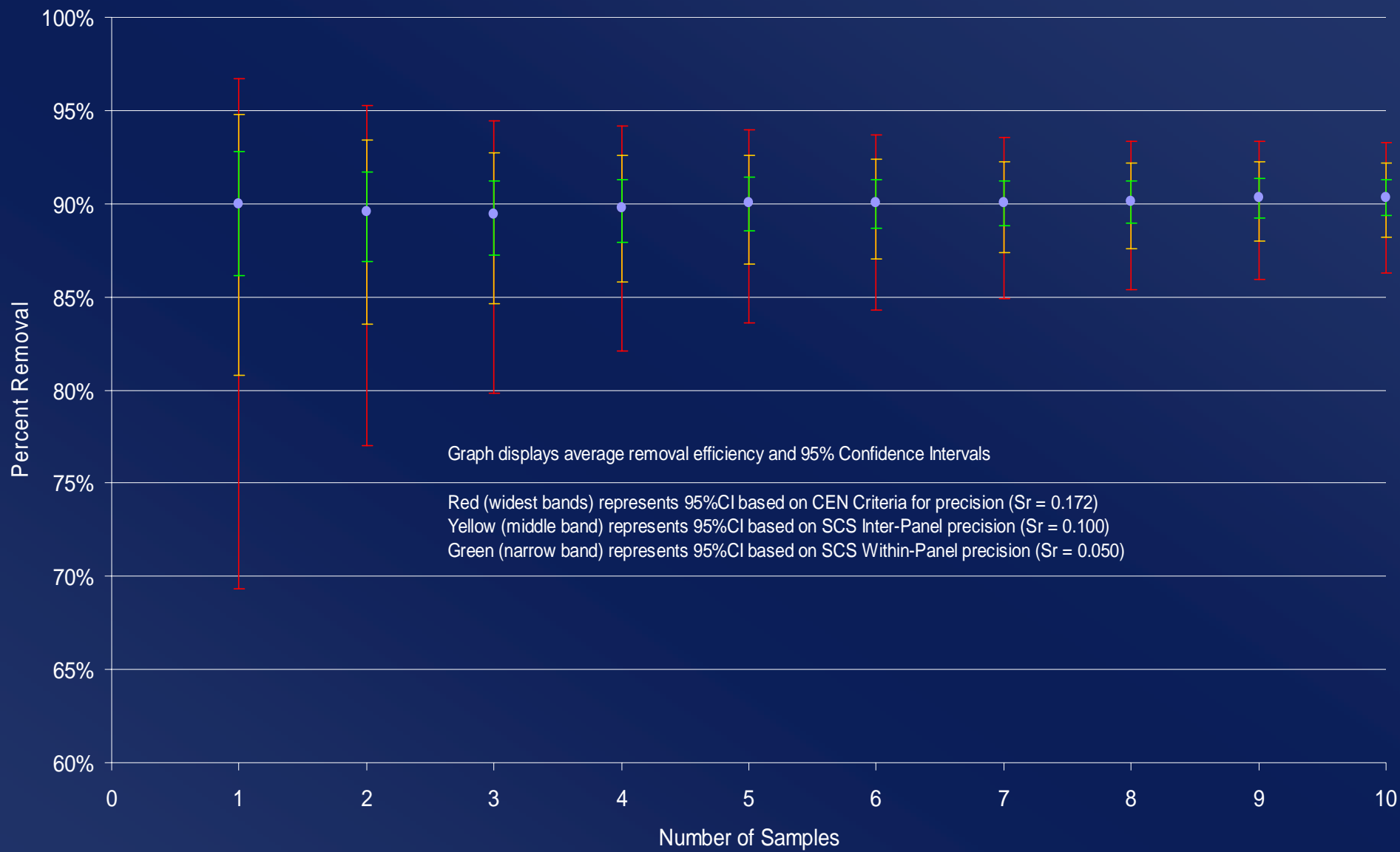
**EN13725:2003 Annex H**

- Test a Biofilter odour control system
- 90% required odour removal efficiency
- Inlet and Outlet sampled in triplicate (3)

# Examples of Performance Testing

- 3 Pairs of Inlet and Outlet Samples
- Consider the 95% C.I. of removal efficiency
- Lab just meets EN13725 criteria (0.172)
  - 79.9 – 94.5%
- Inter-panel variance = 0.10
  - 84.6 – 92.7%
- Within-panel variance = 0.05
  - 87.2 – 91.2%



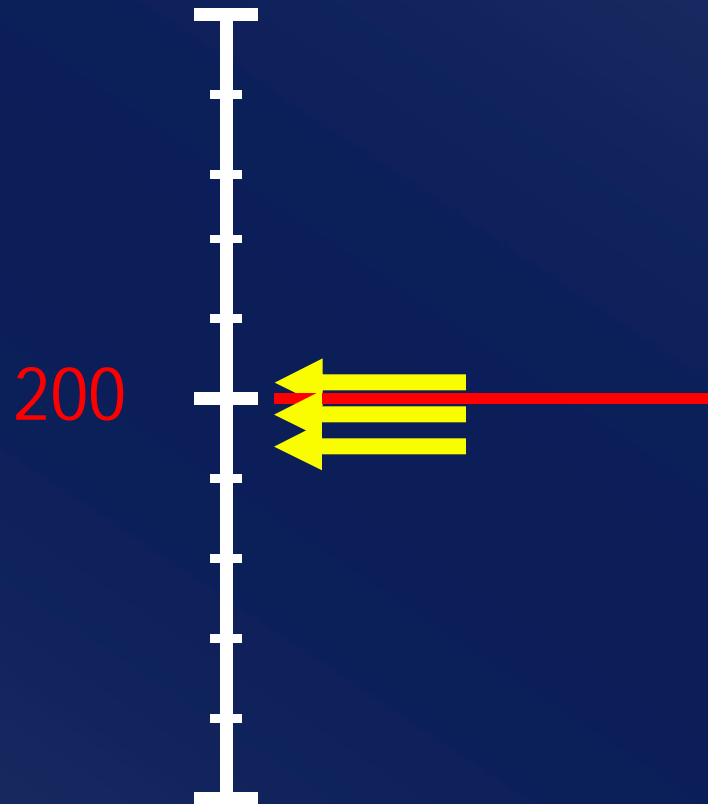


# *Maximum Outlet Odour – example*

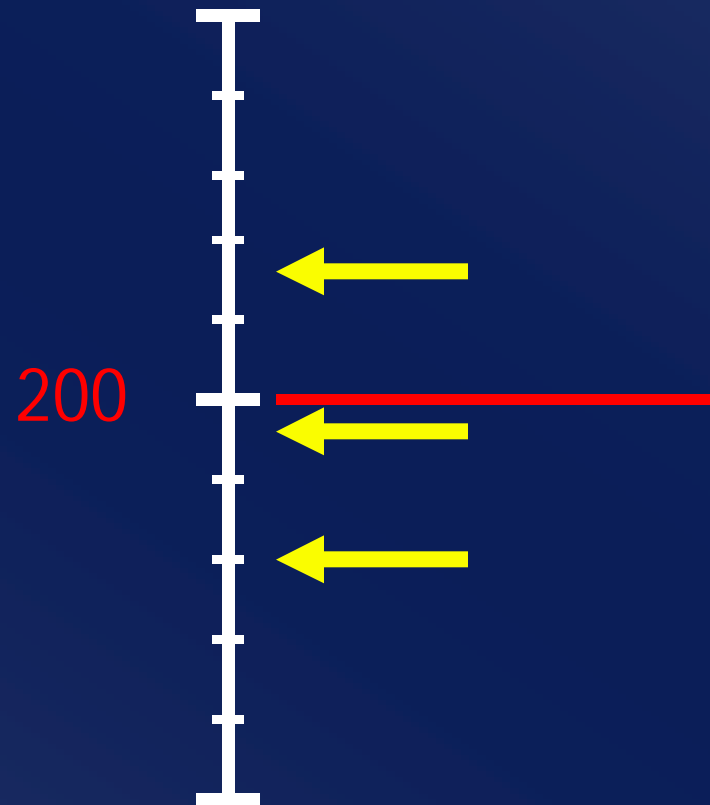
EN13725:2003 Annex G

- Test a scrubber odour control system
- Maximum outlet odour concentration of 200
- Outlet of scrubber sampled in triplicate (3)

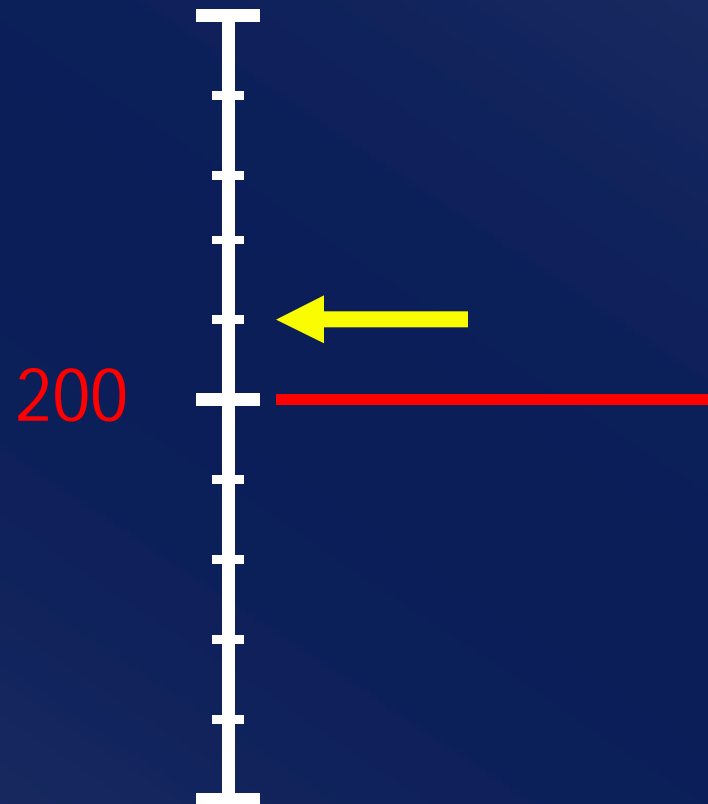
## Pass or Fail?



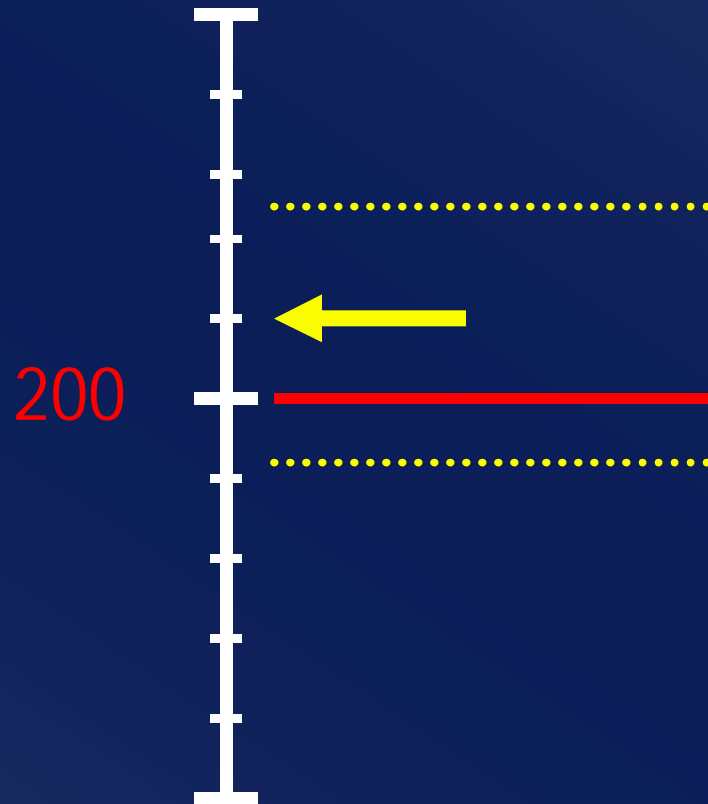
## Pass or Fail?



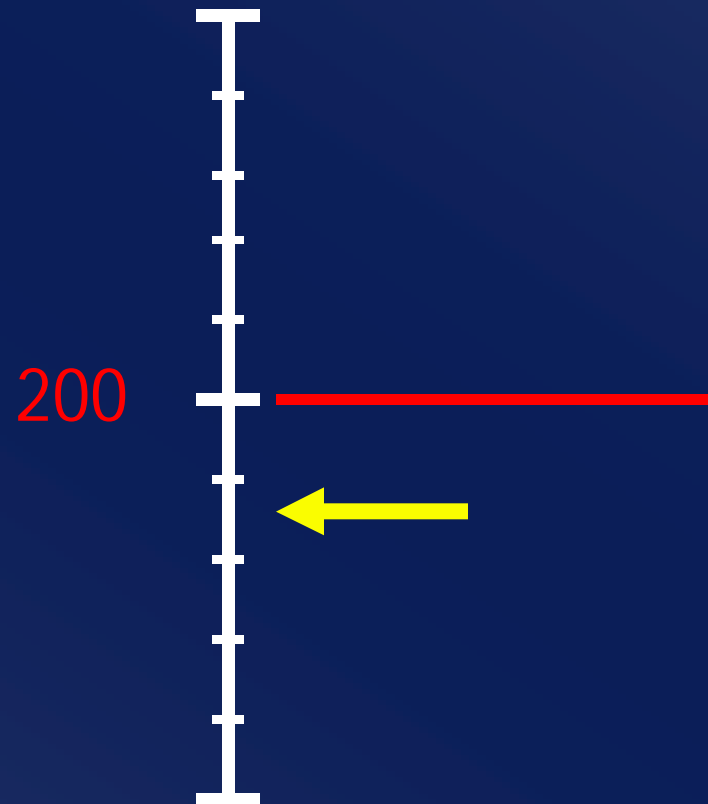
Pass or Fail?



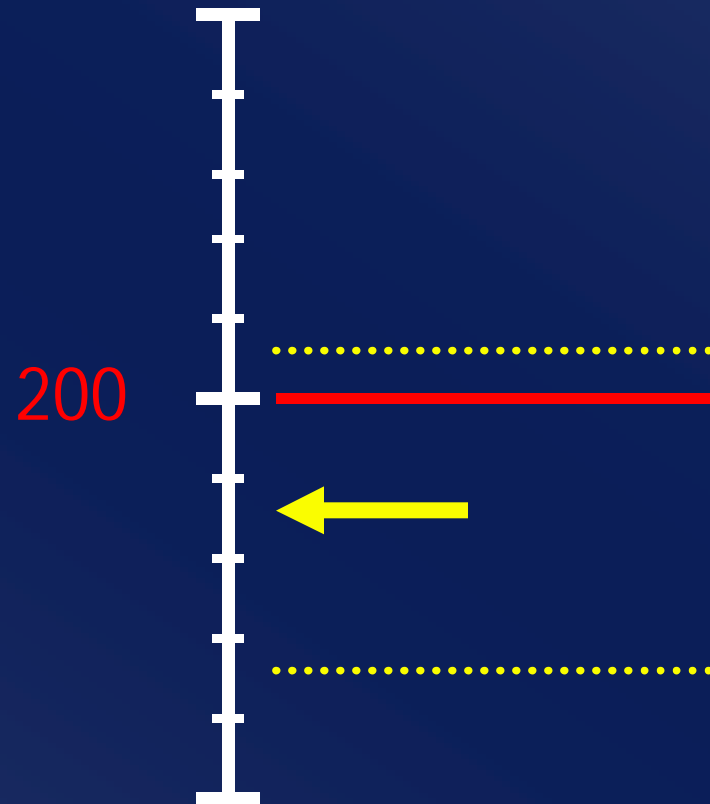
# Pass or Fail?



Pass or Fail?



# Pass or Fail?





## Setting a performance test limit



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Bright Line?

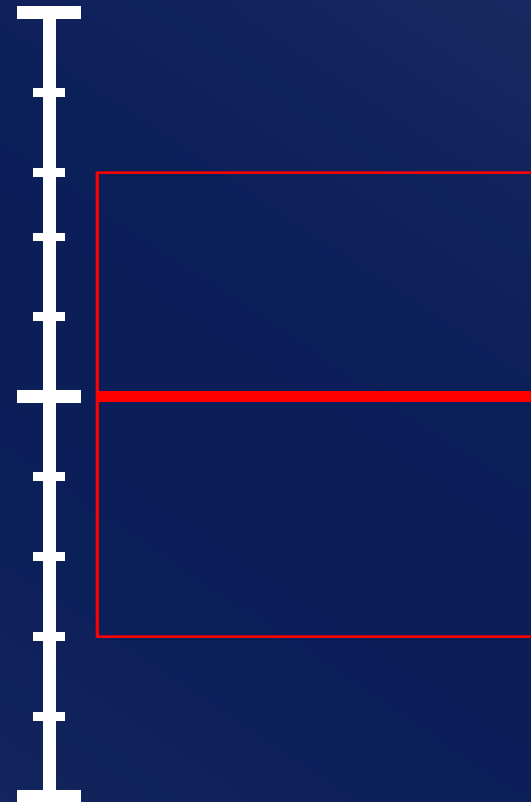


## Setting a performance test limit

Bright Line?

or

Range?



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Bright Line?

or

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Defined by EN13725 and verified by the laboratory

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How do we know  
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How do we know  
if an odour control system  
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Defined by the specification's acceptance criteria  
and verified by statistical analysis





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