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## Capability of detection —

Part 4:

### Methodology for comparing the minimum detectable value with a given value

*Capacité de détection —*

*Partie 4: Méthodologie de comparaison de la valeur minimale détectable avec une valeur donnée*



Reference number  
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## Foreword

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ISO 11843-4 was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Subcommittee SC 6, *Measurement methods and results*.

ISO 11843 consists of the following parts, under the general title *Capability of detection*:

- *Part 1: Terms and definitions*
- *Part 2: Methodology in the linear calibration case*
- *Part 3: Methodology for determination of the critical value for the response variable when no calibration data are used*
- *Part 4: Methodology for comparing the minimum detectable value with a given value*

## Introduction

An ideal requirement for the capability of detection with respect to a selected state variable would be that the actual state of every observed system can be classified with certainty as either equal to or different from its basic state. However, due to systematic and random variations, this ideal requirement cannot be satisfied for the following reasons.

- a) In reality all reference states, including the basic state, are never known in absolute terms of the state variable. Hence, all states can only be characterized correctly in terms of differences from the basic state, i.e. in terms of the net state variable.
- b) In order to prevent erroneous decisions, it is generally recommended to report differences from the basic state only, i.e. data in terms of the net state variable.

NOTE In ISO Guide 30 and in ISO 11095, no distinction is made between the state variable and the net state variable. As a consequence, in those two documents reference states are — without justification — assumed to be known with respect to the state variable.

- c) Furthermore, the calibration and the processes of sampling and preparation add random variation to the measurement results.

In this part of ISO 11843

- the probability is  $\alpha$  of detecting (erroneously) that a system is not in the basic state when it is in the basic state;
- the probability is  $\beta$  of (erroneously) not detecting that a system, for which the value of the net state variable is equal to the minimum detectable value ( $x_d$ ) is not in the basic state.