

ISO 24647:2023-02 (E)

Non-destructive testing - Robotic ultrasonic test systems - General requirements

| Contents | | Page |
|-----------------|--|-------------|
| Foreword | | v |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 1 |
| 4 | Requirements for test personnel | 2 |
| 5 | Test system | 2 |
| 5.1 | General | 2 |
| 5.2 | Design principles | 3 |
| 5.3 | Test equipment | 3 |
| 5.3.1 | Instrument | 3 |
| 5.3.2 | Probes | 3 |
| 5.3.3 | Robots | 3 |
| 5.3.4 | Couplant | 4 |
| 5.4 | Typical test systems | 4 |
| 5.4.1 | Single-robot test system | 4 |
| 5.4.2 | Twin-robot test system | 6 |
| 6 | Characteristics and requirements for robotic ultrasonic test systems | 9 |
| 6.1 | General | 9 |
| 6.2 | Test technique | 9 |
| 6.2.1 | General | 9 |
| 6.2.2 | Pulse-echo technique | 9 |
| 6.2.3 | Trough-transmission technique | 9 |
| 6.3 | Planning of scan pattern and programming of robot motion control | 9 |
| 6.3.1 | General | 9 |
| 6.3.2 | Path planning method | 9 |
| 6.3.3 | Restrictions | 12 |
| 6.4 | Synchronisation of the acquisition of ultrasonic and position data | 12 |
| 6.4.1 | Synchronisation of ultrasonic signal and robot position | 12 |
| 6.4.2 | Synchronisation -- Minimum requirements | 12 |
| 6.4.3 | Synchronisation -- Optional requirements | 13 |
| 6.5 | Conditions for the application | 13 |
| 7 | Verification of the test system | 13 |
| 7.1 | General | 13 |
| 7.2 | Ultrasonic instrument and probes | 14 |
| 7.2.1 | General | 14 |
| 7.2.2 | Single-probe systems | 14 |
| 7.2.3 | Multi-probe systems | 14 |
| 7.2.4 | Normalization of pulse-echo systems | 14 |
| 7.2.5 | Normalization of through-transmission systems | 14 |
| 7.3 | Robots | 14 |
| 7.4 | Synchronization | 15 |
| 7.5 | Complete system -- Robots, instrument and probes combined | 15 |
| 7.5.1 | General | 15 |
| 7.5.2 | Signal-to-noise ratio | 15 |
| 7.5.3 | Image distortion coefficient | 16 |

| | | |
|-----------------------|---|----|
| 7.5.4 | Detection sensitivity | 16 |
| 8 | Typical process of an automated test for a robotic ultrasonic test system | 17 |
| 8.1 | Preparation | 17 |
| 8.2 | Probes | 17 |
| 8.3 | Trajectory planning | 17 |
| 8.4 | Setup of the scanning reference coordinate system | 17 |
| 8.5 | Test procedure | 17 |
| 9 | Documentationoftheverificationresults | 18 |
| Annex A (informative) | Trajectory planning | 19 |
| Annex B (informative) | Exampleofaverificationreport | 30 |
| Bibliography | | 34 |