**Requirement Specification Micro/Macro Hardness**

1. **Requirements**

**1.1. Description of the requirement**

DALO Laboratory wishes to purchase a fully automated Micro/Macro hardness tester to covers the measurement intervals 50 g to 62,5 Kgf and the methods: Vickers, Knoop and Brinell.

The Laboratory has to make hardnesstesting, mostly related to quality control after break down or observations like fast wear, cracks and etc. found on operative material from all 3 armed forces.

Therefore the Laboratory wishes for a system with a high automatization level and a good capability for presenting the results for people without a laboratory background.

**1.2. Description and definitions**

The requirement specification, cf. section 1.4, describes all the requirements for the acquisition and consists of six columns with the following information:

|  |  |
| --- | --- |
| "#" | ID number |
| "Requirement" | Requirement description |
| "Classification" | The classification of the requirement as further described in section 1.3 |
| "DALO remarks" | Further information regarding the requirement |
| "Requirement compliance" | The tenderer's indication of compliance (YES or NO) |
| "Tender description" | Requirements regarding the tenderer's compliance description |

**1.3. Classification**

All requirements are mandatory requirements (SHALL) shall be fulfilled by the tenderer. If just one of the mandatory requirements is not fulfilled, the tenderer's tender will not be taken into further consideration.

**1.4. Requirement and response sheet**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Requirement** | **Classification** | **DALO remarks** | **To be filled out be the tenderer** | | |
| **Requirement compliance**  **(tick a box)** | | **Tenderer's description** |
| **YES** | **NO** |
|  | The micro hardness tester shall be a bench top model. | SHALL |  |  |  |  |
|  | The micro hardness tester shall have a test load range covering the range of 50 gf to 62,5 kgf | SHALL |  |  |  |  |
|  | The micro hardness tester shall cover Vickers, Knoop and Brinell hardness test methods | SHALL |  |  |  |  |
|  | The micro hardness tester shall have a motorized xy-stage with a minimum stroke140 x 120 mm. | SHALL |  |  |  |  |
|  | The micro hardness tester shall have a motorized z-axis with minimum 140 mm test height. | SHALL |  |  |  |  |
|  | The micro hardness tester shall be provided with an overview camera displaying the test area. | SHALL |  |  |  |  |
|  | The micro hardness tester shall have a motorized turret with a minimum of 6 +1 positions. | SHALL |  |  |  |  |
|  | The micro hardness tester shall be provided with an anti-collision protection system | SHALL |  |  |  |  |
|  | The micro hardness tester shall be provided with dual monitors. |  |  |  |  |  |

**Accessories.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Appropriate fully calibrated indenters with calibration certificate shall be supplied with the micro hardness tester on delivery. | SHALL | Indenters:  Vickers  Brinell Ø 2,5mm.  With all necessary adapters. |  |  |  |
|  | The micro hardness tester shall be delivered with sample holders with the ability to accommodate at least 6 mounted samples, sizes of 25 mm and 40 mm diameter, allowing for a parallel testing surface. | SHALL | All necessary adapters to be included |  |  |  |
|  | The micro hardness tester shall  Be provided with proper clamping device/precision vice for thin specimens as well as normal mounted & un mounted specimens. | SHALL | Holder for a single mounted specimen (25 and 40 mm) adapters included.  50 mm vice  V shape vice  Leveling vice for un mounted irregular shape |  |  |  |
|  | Certified testing blocks shall be provided. | SHALL | 500 + 20 HV 0,5  350 + 20 HB |  |  |  |
|  | The micro hardness tester shall be provided, as a minimum, with objectives allowing an overview image, 10X and 50X. | SHALL |  |  |  |  |

Software

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | The micro hardness tester shall be provided with a software package allowing for full automatic measuring | SHALL |  |  |  |  |
|  | The micro hardness tester shall have the ability to program automatic test cycles for multiple samples. | SHALL |  |  |  |  |
|  | The software shall have all functions mentioned in remarks activated on delivery. | SHALL | Case depth measurements  Surface/area mapping  Edge detection  Contour, scanning and stiching  Welding  K1c fracture measurements  Rapport editor  Data export  Auto fokus |  |  |  |
|  | The software provided shall have the ability to easily save and retrieve results, export to Microsoft programs and produce customized reports. | SHALL |  |  |  |  |
|  | The supplier shall have installed, commissioned and calibrated the equipment and its peripheral accessories on delivery | SHALL | Accessories defined in ID 9 to ID 13 |  |  |  |
|  | The supplier shall provide instrument/software training on site for up to 3 persons | SHALL |  |  |  |  |
|  | The supplier shall include a maintenance, calibration and support contract.  The first 2 years shall be fully covered by the manufacturer’s warranty.  An additional 4 years cover will include annual preventative maintenance (PM) visit; direct calibration as required.  Travel and spare parts for PM and calibration visits; and software/firmware updates. | SHALL |  |  |  |  |