## PbWO4 crystal quality specifications

Crystal specification parameters, NPS requirements.

| Parameter | Unit | NPS Required |
|---|---|---|
| Light Yield (LY) at RT (90% within 100 ns gate at RT, for all sides polished crystals) | pe/MeV | ≥15 |
| LY uniformity between blocks | % | 10% |
| LY(100ns)/LY(1μs) | % | >95 |
| Longitudinal Transmission<br>at λ=360 nm<br>at λ=420 nm<br>at λ=620 nm | <br>%<br>%<br>% | <br>≥35<br>≥60<br>≥70 |
| Transverse Transmission and LY uniformity along crystal | % | 10 |
| Inhomogeneity of Transverse Transmission Δλ at T=50% | nm | ≤5 |
| Induced radiation absorption coefficient Δk at λ=420 nm and RT, for integral dose >100 Gy | $m^{-1}$ | <1.1 |
| Mean value of dk | $m^{-1}$ | ≤0.75 |
| Tolerance in Length<br>Tolerance in sides | μm<br>μm | ≤±100 -≤±50 |
| Surface polished, roughness Ra | μm | ≤0.02 |
| Tolerance in Rectangularity (90°) | degree | ≤0.1 |
| Purity specific. (raw material) | | |
| Mo contamination | ppm | <10 |
| La, Y, Nb, Lu contamination | ppm | ≤40 |

In addition to the specification shown in Table 1, crystals should have no visible cracks in the main volume. On the chamfers prolonging in to the crystal cracks should be not more than 0.5 mm deep.

Crystals delivered by the vendor should be packed, in separate packages, lamellar foamed polyurethane and a cellular Styrofoam container, or similar, to protect individual crystals for transportation and handling. Shipment packing is to further secure safety from damage during transportation, as well as to protect crystals from atmospheric influence. Each box should include a packing list.

## Conditions for crystal certification and acceptance

The Neutral Particle Spectrometer (NPS) collaboration is responsible for the certification of the crystals delivered by CRYTUR. The NPS collaboration is not obliged to disclose the results of the certification to CRYTUR, except for rejected crystals. The result of the certification will be summarized in a certification protocol including the following parameters

- Individual number corresponding to the CRYTUR number
- Dimensions of the crystal
- Visual inspection report
- Optical properties of the crystal:
    - T, % at 360nm,
    - T, % at 420nm,
    - T, % at 620nm,
    - Scintillation yield
    - Scintillation kinetics
    - Non-uniformity of the transversal transmission
- Radiation hardness (if measured)