VLT PROGRAMME

EUROPEAN SOUTHERN OBSERVATORY

Organisation Européenne pour des Recherches Astronomiques dans l'Hemisphère Austral
Europäische Organisation für astronomische Forschung in der südlichen Hemisphäre

VERY LARGE TELESCOPE

MACAO-VLTI
OPTICAL DEROTATOR

Technical specifications and statements of work

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Change Record

Issue	Sections affected	Date	Description
1.0	***All***	***30/11/2000***	**first issue**

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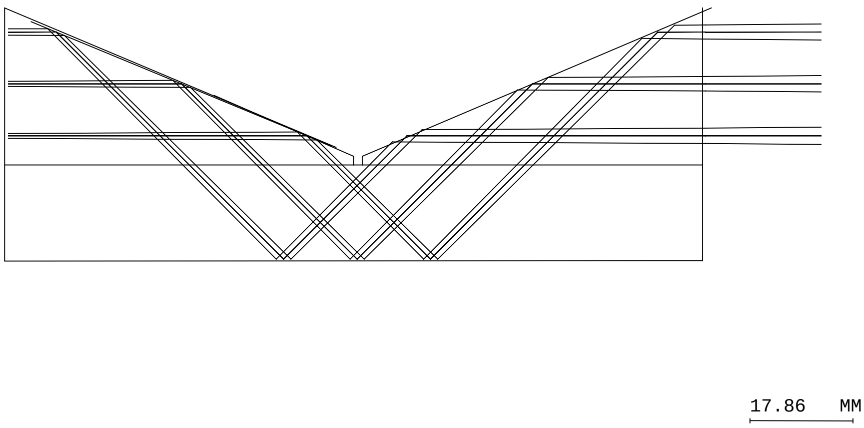
1 Introduction

This optical derotator will be used in a 22 mm parallel beam. This derotator concept has been preferred to a classical Dove prism to avoid the chromatic displacement of the beam.



2 Statement of work

2.1 Contractor undertaking

The Contractor shall perform the following activities:

- Procurement of the blanks
- Detailed design of the mechanical structures
- Manufacturing of the mechanical structure
- Manufacturing of the optical derotator
- Anti-reflective Coatings
- Integration of the derotator in the mechanical structure
- Acceptance tests
- Packing and transport to ESO Garching

2.2 Project planning

Kick-off meeting, place of contract	T0
Final Design Review (FDR)	T0 + 2 months
Provisional acceptance	T0 + 7 months

2.3 Reviews, reports and meetings

- **Kick-off meeting (KO)** Clarification of open points, including interfaces. Establishing of project organization, project planning with milestones and action lists.

- **Final Design Phase:** The Contractor shall provide a design report including the final mechanical design, interfaces and manufacturing process as well as a test procedure report of the derotator. A Final Design Review (FDR) is organized at Contractor premises with ESO representatives

- **Provisional acceptances:** The Contractor shall perform all tests described in the test procedure report presented and agreed at the FDR. A test report for each derotator unit shall be prepared

- **Final acceptance:** Final acceptance is granted at the end of the warranty period of 2 years after provisional acceptance.

2.4 Deliverable items

The following items shall be supplied at each phase of the project:

Milestone	Item(s)	Delivery	Requirements in
KO	KO minutes	report	Section 2.3
FDR	Final design and test procedure reports	reports	Section 2.3
PA 1	Derotator + transport box + test report + as-built drawings	4 or 5 units	Section 3 & 4

2.5 Price inquiry replies:

The replies to the price inquiry shall contain:

- Statement of compliance to the ESO technical specifications
- Cost of 4 derotator units
- Cost for one additional derotator unit
- Project plan and delivery schedule
- Duration of warranty period

3 Technical Specifications

3.1 System description

The derotator consists of two BK7 prisms cemented on a BK7 plane parallel plate (see VLT-DWG-ESO-15600-0-151000-001 (3). The two prisms may be manufactured simultaneously to obtain identical prism angles.

3.2 System technical specifications

The derotator to be delivered shall be manufacture as specified by drawing VLT-DWG-ESO-15600-0-151000-000 (3).
The following system specifications shall be met:

- **Image quality specifications:**

The maximum wavefront error introduced by the derotator shall be less than 50 nm rms (focused removed) for a 22mm parallel beam.

- **Derotator function** :

The beam lateral deviation measured at 50 mm from the exit surface of the derotator shall not exceed 30µm for 180º rotation of the derotator

- **Cosmetic specifications:**

Rms surface finished better than 3nm rms. Scratch and dig: DIN 3140/7; 5/3x0.025;K1x0.025

System transmission:

- Wavelength range : 450 to 1000 nm
- Average efficiency > 98%
- Absolute efficiency > 97%

(The 3 reflections are total internal reflections)

Mechanical interface
The system shall fulfil the opto-mechanical interfaces defined by drawing VLT-DWG-ESO-15600-0-151000-000 (3).

Mechanical Surface treatments:
All mechanical surfaces shall be black anodised excluding contact and coated surfaces

3.3 Environmental specifications

The system specifications shall be met during operation or after transport under the following conditions:

- **Thermal**
  - Operation: 0 to 15°C.
  - Storage (in storage box): -5°C to 30°C, with instantaneous gradients of 20°C applied to the outside of the box as this could happen when the box is taken from a heated laboratory to the telescope.
  - Transport: the temperature range shall be restricted to that of storage, taking special precautions if necessary.
- **Relative humidity**

  5 to 100%

- **Maintenance**

- The items shall not require periodic maintenance actions in particular regarding re-coating.
- Cleaning of optical surfaces and mechanical parts shall be possible using standard techniques.

♦ **Motion**

The derotator will operate with a horizontal axis.

♦ **Lifetime**

The optical coatings and the mechanical surface painting must not degrade for 10 years.

4 Provisional acceptance tests

Provisional Acceptance shall cover the following requirements. The tests are executed at room temperature. Results shall be recorded in a test report. ESO representatives shall be present. The Contractor may propose alternative test methods, which, however, shall address all requirements

General items to be checked are:

Requirements	**Check/Test methods**
Material	Certificates of material quality
Dimensions	Check of conformity of mechanical dimensions and surface finish with interface and design drawings
Vignetting	Check on mechanical drawings
Image quality	Interferometric measurement
Scratch and dig	Photo before mirror mounting
Transmission efficiency	Measurement can be done on samples
Derotation function	Contractor is free to select its own method