Radiation Protection for Urology
Introduction: Radiation protection is important and is already being used successfully in various medical sectors. Up to now, urologists had to resort to protection, developed for other areas of medicine. Filling a niche in the market, MAVIG has developed a range of protective products, specifically designed for urology. Our new product range provides greatly improved and advanced protection.

Let us invite you to explore the possibilities now open to you:

**RA641 – Special X-Ray Protective Apron**
Designed for working standing up or seated

**OT81/OT91 – Special Radiation Protective Shield**
Radiation protection designed for the lithotomy position

**AS100 - Special Radiation Protective Drapes, Radionex®**
Positioned on the patient to reduce exposure to scattered radiation

**Other Important Radiation Protection Products**
Thyroid-sternum protection, gloves, headwear, eye protection

**Portegra2 - A Versatile Suspension System**
Ceiling or wall mounted for shields, lamps, and monitors

"MAVIG is the world’s first and only manufacturer of radiation protection to introduce a complete range, designed to fully protect the urologist from hazardous X-rays."

X-Ray Protective Clothing and Accessories
In addition to the specific brochure featuring our new "Total Concept for Urology" MAVIG's main brochure offers a multitude of other protective products for the medical field of radiation.

Brochures are available upon request.

Your MAVIG Team
X-ray protective clothing from MAVIG gives you the security of knowing that you comply with all applicable legal requirements. This model complies with IEC 61331-1:2014 / DIN EN 61331-1:2016 and IEC 61331-3:2014 / DIN EN 61331-3:2016. Of course MAVIG X-ray protective clothing also has the required prototype testing and certification in compliance with PPE 89/686/EEC (CE0123).
Comprehensive Protection for all Applications

RA641

State-of-the-art user protection for urology. Using a functional one-piece apron which complies with the respective standards ensures ideal X-ray protection in any working position.

Protective aprons are already standard equipment in urology. However, the aprons currently used only offer protection while working standing up. But especially in urology a number of examinations are performed while being seated. When using a common front protection apron while working seated the gonads might be exposed to a higher dose of X-rays. This is shown in a study by Horsburgh et al: “A Study of Occupational Radiation Dosimetry During Fluoroscopically Guided Simulated Urological Surgery in the Lithotomy Position” (*1). The protection gap is caused by the apron resting on the knees.

With the innovative MAVIG urology radiation protection apron you are now securely protected in any application, thanks to our versatile, detailed solutions.

The apron was especially designed for seated positions. For this purpose we added a detachable gonad protection shield to the inside of the apron which protectively hangs over the gonads when sitting in front of the patient while the apron itself rests on the legs.

At the same time, we added larger side panels to the lower part of the apron which prevent the apron from slipping down from your legs when moving.

Also when standing, the RA641 guarantees complete X-ray protection from the neck to the knees. The sides of the apron can be fastened in the back to avoid movement while working. The special gonad protection can be detached to save carrying extra weight.

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Ergonomically Designed and Surprisingly Comfortable

The innovative elastic belt, located on the inside of the front panel, rests most of the apron’s weight on the hips. This relieves the back and shoulders. In addition, soft shoulder pads are standard.

Optionally two adjustable snap buckles in the back or a convenient strap with a snap buckle that closes in the front make it easy to securely put on the apron. Both closure types are attached to easily adjustable straps to prevent the apron from slipping.

You can use your apron reliably for years, the hook & burr fastener of the belt is replaceable.

The special gonad protection can easily be detached, when not needed.

When the operator is seated facing the patient, the protector hangs in front of the gonads, while the apron rests naturally on the legs.

The size depends on the girth of the chest, waist, or hip, depending on which of the three measurements is the largest.
In 2011 the ICRP issued a recommendation to lower the annual allowed dose of radiation to the human eye (**). Nevertheless, the special protection of the eye lenses has rarely been observed in urological interventions.

This recommendation will come into effect in February 2018 (**). As of then, the currently allowed 150 mSv per year will be lowered to only 100 mSv in 5 years, in which each yearly dose must stay below 50 mSv.

This new limit will cause considerable re-thinking in urology. As an example Tayler E. et al (**) conducted a study of patients in which they found an average dose of 208 μSv during ureteroscopy (URS) and stent placements.

If multiplied, this average dose would mean, that with the new limit taking effect, an urologist could only perform 96 interventions per year (assuming a dose value of 20 mSv per year).
Scattered X-Ray Radiation in Urology
Monte-Carlo-Simulation for the lithotomy position, radiation exposure of the user without protection

Use of a Shield in Urology
Monte-Carlo-Simulation for the lithotomy position, radiation exposure of the user with protective shield.

Conclusion from Recommendation & Simulation

Effective radiation protection has to take into account the distinctive features of procedures carried out in the lithotomy position. The source of the radiation is in most cases above the table. This also adds to the high exposure rate of the doctor, especially for their head which is usually unprotected.

Therefore, explicit protection of the head is highly recommended in urology (**, **).

Especially when working with the patient in lithotomy position, conventional, wide radiation protection shields can rarely be used due to the limited space and the special patient positioning.

This led MAVIG to develop a new radiation protection shield specially optimized for this profile of requirements.

In a patient study by Knoll et al (**) with measurements of the dose to the head during Ureteroscopy examinations (URS), a statistically significant reduction of the dose to the head of 59% was achieved by using the MAVIG radiation protective shield OT81/OT91.

Learn more about this on the following pages ...
Innovative X-Ray Protection in Lithotomy Position

The newly developed shield can be optimally integrated into the urology workflow.

Despite the extremely confined space available, the shield offers optimal scattered radiation protection for the examiner.

- Effective radiation protection for the head of the operator
- Optimized for procedures carried out in lithotomy position
- Dramatic reduction in the exposure to scattered radiation, especially for the eye lens
- A perfectly shaped radiation protective shield made of highly transparent acrylic
- Compatible to previously installed Portegra2 ceiling suspensions
- Specially designed, sterile disposable covers for the lower third of the shield for a perfect fit and clear view
Maximum safety and high functionality are fundamental principles in all radiation protection shields manufactured by MAVIG.

The high quality of the acrylic radiation protection shield allows for optimal transmission and thus the best possible view.

The laterally guided protective shield can be easily installed on MAVIG’s patented Portegra2 ceiling suspension system and support arms, which are known throughout the medical sector as the global standard.

Specially designed sterile disposable covers for the lower third of the shield allow for safe, sterile work while maintaining an unobstructed view through the upper part of the shield.

Self-protection: Wearing suitable X-ray protective clothing in combination with the installed protection solution is obligatory.

Specially designed sterile disposable covers for the radiation protection shield allow for work under sterile conditions.

Technical Specifications

<table>
<thead>
<tr>
<th>Radiation protection shield for urology Series OT81 and OT91</th>
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<tbody>
<tr>
<td>Material / Lead Equivalent (Pb)</td>
</tr>
<tr>
<td>Transparent acrylic: Pb 0.50 mm</td>
</tr>
<tr>
<td>Dimensions</td>
</tr>
<tr>
<td>Shield size: 280 x 420 mm (W x H)</td>
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</tbody>
</table>

System Components

Articles OT81 / OT91

- Acrylic radiation protection shield, laterally guided
- Portegra2 suspension arm, consisting of a horizontal extension arm arm with a length of 750 mm (OT81) or a length of 950 mm (OT91), and a height-adjustable spring arm with a length of 910 mm
- Including a box of sterile disposable covers (50 pieces)

Accessories

Article STEA-OT6

Box with 50 sterile disposable covers for OT81 / OT91
Urologists are constantly exposed to the risk of harmful scattered radiation. Minimizing this scattered radiation without interfering with working procedures or patient care is therefore a high priority.

Scattered radiation can be reduced considerably by using specific radiation protective drapes developed for urology. The drapes are easily positioned on the patient. Special adhesive strips hold it firmly in place and prevent it from slipping. Repositioning is possible at any time, should it be necessary.

Radionex drapes provide protection using a lead-free protective material. The exterior material of the drapes is designed to absorb liquids.

Thanks to these features, Radionex can be easily and conveniently integrated into the existing radiation protection plan without interfering with existing workflows.

Radionex® AS100 for Urology

AS100 Drapes
- AS1006 "Uro" for the lithotomy position
- AS1007 "Surgery" for percutaneous nephrolithotomy (PCNL)

Lead Equivalent / Shielding*
- AS1006L Low Pb 0.05 mm 75.3 % (90 kV)
- AS1006M Medium Pb 0.15 mm 90.8 % (90 kV)
- AS1006H High Pb 0.30 mm 95.3 % (90 kV)

Size and Shape
- Protection area: 30 x 40 cm each
- AS1006 "Uro"
- AS1007 "Surgery"

For detailed information on the various models of Radionex drapes, see the separate brochure.

* Measurements of the attenuation characteristics in a broad X-ray beam in compliance with EN 3331-1 (IEC 61331-1 and ASTM-2547-06)
Lead equivalents measured in compliance with DIN 6857-1:2009 in the X-ray tube voltage range of 60 - 120 kV
Accessories for Optimal Radiation Protection

MAVIG makes your safety our highest priority, which makes your choice in radiation protection our greatest endorsement.

In addition to the obligatory radiation protection apron, the MAVIG portfolio offers numerous possibilities, even if it is impossible to install a ceiling suspended system for the radiation protection shield.

**Thyroid Shield, the indispensable accessory for the radiation protection apron**

The thyroid is a radiation-sensitive organ and therefore in particular need of protection. Wearing appropriate protection has to be a "must" in urology.

For information regarding appropriate sternum protection, as well as all other protective clothing and accessories please refer to our main catalogue.

**Sterile X-Ray Protective Gloves**

Sterile protective gloves from MAVIG with shielding effect against scattered radiation guarantee optimisation of the radiation protection measures for the medical staff.

More information about our gloves is available in the HS100 Flyer "Sterile X-Ray Protective Gloves".

<table>
<thead>
<tr>
<th>RA614</th>
<th>Thyroid and sternum protection</th>
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<tbody>
<tr>
<td>Lead Equivalent</td>
<td>Pb 0.50 mm</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Outer Material / Colours</th>
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<tbody>
<tr>
<td>Comfortex® HPMF, available in the following colours:</td>
</tr>
<tr>
<td>• Curacao</td>
</tr>
<tr>
<td>• Orchidee</td>
</tr>
<tr>
<td>• Regatta</td>
</tr>
<tr>
<td>• Indian Summer</td>
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<table>
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<tr>
<th>HS100</th>
<th>Sterile X-ray protective gloves</th>
</tr>
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<tbody>
<tr>
<td>Lead Equivalent</td>
<td>Pb 0.03 - 0.04 mm</td>
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<table>
<thead>
<tr>
<th>Material / Characteristics</th>
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</thead>
<tbody>
<tr>
<td>• Powder-free</td>
</tr>
<tr>
<td>• Extremely tear-resistant</td>
</tr>
<tr>
<td>• Low-protein natural rubber</td>
</tr>
<tr>
<td>• Lead-free</td>
</tr>
<tr>
<td>• Non-toxic</td>
</tr>
<tr>
<td>• Excellent gripping ability</td>
</tr>
<tr>
<td>• Sterile</td>
</tr>
<tr>
<td>• Disposable product</td>
</tr>
<tr>
<td>• Available in the following sizes: 6.5; 7.0; 7.5; 8.0; 8.5; 9.0</td>
</tr>
<tr>
<td>• High elasticity</td>
</tr>
<tr>
<td>• Great touch sensitivity</td>
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</table>
Accessories for Optimal Radiation Protection

**X-Ray Protective Headwear**

Without effective on-site over table anti-scatter protection, the skull is necessarily at risk of high exposure to radiation, depending on the procedure concerned and the fluoroscopy time.

MAVIG has therefore developed three different radiation protective head coverings to meet the users’ individual needs. The individual models differ in the balance between the required protected area and heat dissipation.

**X-Ray Protective Glasses**

The sensitivity of the human eye to ionising radiation is classed as very high.

X-ray protection glasses for health care professionals are used to provide protection against scattered radiation. This is secondary radiation, which is mainly emitted by the irradiated volume of the patient.

A correct fit is particularly important for safety glasses. Therefore the differences in facial geometry require a correspondingly wide range of models.
For many years MAVIG has been the first choice in suspended support systems and X-ray protection for medical practices and hospitals. The solide systems convince due to outstanding quality, maximum safety and the very high degree of flexibility.

Portegra2 is the ideal solution for space saving suspension of lamps, monitors, radiation protection shields, etc. With our ceiling columns up to three pieces of equipment can be in use simultaneously.

Whether you are looking for a far reaching ceiling track or a fixed installation, at MAVIG you always find the appropriate system for your specific needs.

We will be happy to assist you in finding the optimal solution for your location.

MAVIG Life Cycle Testing ensures 100-percent quality of all products delivered. These are UL and CE certified. MAVIG is certified to DIN EN ISO 13485:2012.
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