SKr-U™ Rupture Disk Partnered with a Threaded Union-Type Holder

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The all-purpose SKR rupture disk partnered with a threaded union-type holder

SKR-U features:

- Standard Sizes 1/2", 3/4", and 1" (15mm, 20mm, 25mm)
- +/-5% accuracy of burst pressure in a Union Type Safety Head
- Gas or Liquid service compatibility
- Low Kr values (flow resistance factors)
- Long service life in pressure cycling or pulsating conditions
- Maximum Operating Pressure 90% of Marked Burst Pressure (North American Code)
- Maximum Operating Pressure 95% of Minimum Burst Pressure (European & ISO Standards)
- Fail-Safe™ design -- Damage Safety Ratio ≤1
- Designed for non-fragmentation
- Withstands full vacuum
- Info-tag, 3-dimensional tag indicates correct orientation and code/standard requirements
- Worldwide Patents Pending

The SKR-U™ Rupture Disk is partnered with the UR-2™ Safety Head to provide high integrity reverse buckling rupture disk technology in a threaded union type holder. The SKR-U Rupture Disk uses Saf™ technology (structural apex forming) to accurately control its burst pressure making it insensitive to the assembly torque variations that will occur in a threaded type holder.

The UR-2 Safety Head is available in three standard nominal sizes: 1/2"/15mm, 3/4"/20mm, and 1"/25mm. Standard inlet & outlet female threads are 1/2", 3/4", and 1" NPT. Custom thread configurations are available. The SKR-U Rupture Disks are identified SKR-U 1/2"/15mm, SKR-U 3/4"/20mm, SKR-U 1"/25mm and are all supplied with permanently attached 3-D metal identification tags.

### Materials & Set Pressures

<table>
<thead>
<tr>
<th>Rupture Disk Material</th>
<th>Burst Pressure Minimum</th>
<th>Burst Pressure Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel (alloy 200)</td>
<td>55 psig 3.79 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>316 SS</td>
<td>60 psig 4.13 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>Inconel (alloy 600)</td>
<td>60 psig 4.13 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>Hastelloy C-276 (alloy 276)</td>
<td>60 psig 4.13 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>Tantalum</td>
<td>55 psig 3.79 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>Monel (alloy 400)</td>
<td>60 psig 4.13 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
<tr>
<td>Titanium</td>
<td>90 psig 6.20 barg</td>
<td>500 psig 34.47 barg</td>
</tr>
</tbody>
</table>

The SKR-U is a 2-part rupture disk comprising a calibrated metal dome that faces into and responds to a source of overpressure, and a stainless steel hinge ring permanently fitted to the downstream side of the disk that works together with the safety head to retain the disk petal after opening. These pressures are applicable to all sizes of SKR-U Rupture Disk: 1/2", 3/4" and 1". Standard Safety Head materials are Carbon Steel & Stainless Steel.

Hastelloy is a trademark of Haynes International Inc., Monel and Inconel are trademarks of Inco Alloys International. BS&B may use equivalent materials from other sources.
Fluoropolymer film liners are available as an additional corrosion barrier attached to the inlet side of the SKR-U Rupture Disk. FEP is the standard liner material. PFA and PTFE may be available upon special request. Teflon® materials are typically used. Teflon® is a DuPont trademark.

**Temperature**

The design temperature for the UR-2 Union Safety Head is 700°F/371°C. All of the standard holder and rupture disk materials are available up to this limit except for Titanium & Tantalum. Titanium is limited to 572°F/300°C, and Tantalum is limited to 500°F/260°C. The temperature limits for Fluoropolymer liners are shown below:

- Fluoropolymer Liner (FEP) - 400°F (204°C)
- Fluoropolymer Liner (PFA) - 400°F (204°C)
- Fluoropolymer Liner (PTFE) - 500°F (260°C)

**Thread Connection Options**

While the standard thread connections are 1/2", 3/4" and 1" NPT female inlet & outlet, alternatives are available by special request that will fit within the same overall dimensions.

**Rupture Disk Design**

The SKR-U Rupture Disk takes its design from the solid metal SKR™ reverse buckling disk that is used in flange type safety heads. The SKR-U Rupture Disk has a unique hinge and tag design that allows it to be used in the UR-2 Union holder.

The SKR-U reverse buckling disk is designed with a circular score line located at the edge of the domed area, on the downstream side of the disk. At the burst pressure, the disk's dome reverses and opens by shearing around the circular score line. The use of SAF™ technology (Structural Apex Forming) enables accuracy of burst pressure to be maintained in a union type holder where other technology is highly torque sensitive.

**Pressure Tolerances**

BS&B applies both a burst tolerance and a manufacturing design range to the SKR-U Rupture Disk. Whether North American ASME, European or ISO standards are followed, the approach is the same.

Burst tolerance is the +/- range of pressure over which a rupture disk can be expected to burst. Manufacturing Design Range is a range of pressure, always applied to the minus side of the user requested burst pressure for the SKR-U, that simplifies disk fabrication testing and provides economic benefit to the user where such a broader range of pressures can be accommodated by the application.

Burst tolerance is either +/-5% of burst pressure or +/-2psi/+/-0.138 bar for disks rated below 40 psi/2.76 bar.

**Manufacturing Design Range (MDR) Choices Are Provided For SKR-U Rupture Disks**

- **MDR = 0** : where the user requires the tightest margin between normal service pressure and set pressure, a zero MDR disk shall be used.
- **MDR = -5%** : applied to the requested burst pressure, a -5% MDR allows an additional 5% range of pressure applied on the minus side of the user requested burst pressure.
- **MDR = -10%** : applied to the requested burst pressure, a -10% MDR allows an additional 10% range of pressure applied on the minus side of the user requested burst pressure.

MDR and burst tolerance are additive. In the European & ISO cases, the burst tolerance and MDR are combined. In the ASME case, the 'marked burst pressure' must be a value within the agreed manufacturing design range and then the burst tolerance is applied.

**UR-2 Safety Head – Rupture Disk Installation**

The UR-2 Safety Head contains four metal components: inlet, holdown ring, outlet, and hexagon assembly nut (see cover). The SKR-U Rupture Disk is pre-assembled to the Safety Head between the inlet and the holdown ring using two capscrews. (See photo below) This locates and centers the disk, ensuring the correct direction of installation: these two capscrews and a single locating pin in the UR-2 inlet have an asymmetric layout that matches three holes in the SKR-U disk flange.

This pre-assembly feature ensures that the disk can be easily installed even where the piping flow path may not be ‘vertical up’. The inlet/disk/holdown subassembly is fixed to the UR-2 threaded outlet by the hexagon nut. It is the hexagon nut that provides the sealing load to the Safety Head assembly (the capscrews are for pre-assembly only).

As an option, the UR-2 Safety Head can be provided with a threaded connection on the outlet side to enable the connection of a 'tell-tale' assembly. This will enable monitoring of pressure downstream of the SKR-U Rupture Disk, or installation of an excess flow valve to ensure downstream pressure is at atmospheric conditions. One of these measures is required by Codes and Standards when a rupture disk is installed upstream of a pressure relief valve.
**Torque Drive Adapter**

Accurate torque control on a large hexagon can be difficult. BS&B Safety Systems can provide a Torque Drive Adapter for use with all UR-2 Safety Heads (one adapter for all sizes). This adapter permits the use of a standard torque wrench for control of installation load through tightening of the external hexagon nut. The torque drive adapter is available as an accessory.

### MNFA, NRA

<table>
<thead>
<tr>
<th>Unit Size</th>
<th>in</th>
<th>mm</th>
<th>in</th>
<th>mm</th>
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</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>15</td>
<td>3/4&quot;</td>
<td>20</td>
<td>1&quot;</td>
</tr>
<tr>
<td>MNFA (in²)</td>
<td>0.304</td>
<td>0.533</td>
<td>0.608</td>
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<tr>
<td>NRA (cm²)</td>
<td>1.96</td>
<td>3.43</td>
<td>3.92</td>
<td></td>
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**Sealing**

The SKR-U Safety Head incorporates a 'bite-type' seal. This concentrates the holder assembly load to cut an impression in the SKR-U Rupture Disk flange that ensures a leak tight installation.

A gasket (compressed non-asbestos fiber) is placed inside the UR-2 Safety Head between the holder outlet and the disk holdown ring to ensure a good seal on the downstream side of the installation after assembly of the holder. This gasket is supplied with each SKR-U Rupture Disk, and should be replaced with each new disk.

**Pressure Rating of Holder**

The design pressure of the UR-2 holder is 1,000 psi/68.95 Bar. This exceeds the 500 psi/34.47 Bar maximum burst pressure of the SKR-U Rupture Disk.

**Codes & Standards**

The SKR-U & UR-2 are manufactured in conformance with the following international codes and standards:

- ASME Section III & VIII (UD stamped)
- ISO 6718
- BS2915
- TUV AD Merkblatt A1
- SVTI
- Stoomwezen
- CEN, EN ISO 4126-2 (pending)