INTRODUCTION

This guidebook summarises over 25 years’ safety shielding experience, and is designed to provide a start-to-finish guide to shielding projects and requirements.

Whilst safety shields & flange guards are relatively simple products, it is important to have a clear understanding of what is required (purpose & shield type) and exactly which plant areas and pipe runs need shields.

Consideration of a variety of issues is required to ensure success, otherwise shielding projects can run into problems, normally during the survey, installation phase, or later on when additional shields are required.

This guidebook can be used for information only, or, by completing the customer-entry sections, to create your own full specification of requirements. If you would like our recommendation on shield type & material, complete all sections and email or fax back to us. If you have already settled on the shield type, simply return the survey section.

For further information or clarification, please do not hesitate to contact us.

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DRIVER / REASON FOR SHIELDS

Many different motivations exist for the installation of safety shields. What is the driver behind your current requirements?

**Recent incident or near-miss on site, or associated site**
Very often, site incidents or near-misses will necessitate a safety review, at which time safety shields are considered as corrective or preventative action.

**Industry regulations**
Various regulations exist, some specifying safety shielding (SOLAS, marine industry) and others recommending shielding as a control measure (EP15 energy industry).

**Insurance requirement**
The cost of site fires, explosions and personal injury is significant. Industrial insurers now focus specifically on spray-out and oil mist prevention, and often insist on safety shielding.

**Hazardous area zoning issue**
DSEAR reclassification can create technical and commercial complications. Many customers use safety shields as part of their case to reduce zoned areas.

**Company-wide policy/philosophy & best practice**
In an attempt to reach the goal of ‘zero accidents’, many large companies create and insist upon safety policies and requirements that often include safety shielding.

**Other**
There are a variety of other reasons to fit shields, including pollution control, general site cleanliness and protection of nearby electrical equipment.
PURPOSE

What are the main purposes of the shields? There may be more than one, and some might just be ‘nice to have’:

**Prevent Spray-outs**
Generally the most important requirement is to stop a leak from causing damage or injury. Even at low pressure, leakage can result in spray-out.

**Avoid oil mist formation**
For certain oil & fuel applications, oil mist formation is just as hazardous as a spray-out. Furthermore, ill-fitting safety shields can actually create mist formation.

**Provide leak indication**
It is important to identify leaks as quickly as possible, though the process will determine the urgency. For certain acid lines, some customers require that flanges must not be concealed. This is achieved using transparent shielding. Alternatively leak-indicator patches can be used. For other process liquids, leaks will be self-evident.

**Containment**
Whilst standard safety shield designs generally do not provide secondary containment (indeed there should be a leak path to avoid pressure build-up), we can offer special design incorporating drain nipples and a system to channel liquid releases.

**Other**
The specific purpose of the shield may be unique to your site. We have a variety of shield types and materials, to solve practically any problem.

SCOPE

Which areas and plants on site require shielding? Consider the risk of leakage, the nature of the process and the local vicinity:-

**Oil lines near hot surfaces**
Do you need to install shielding for all oil lines, or only those in close proximity to hot surfaces?

**Acid Lines near personnel or walkways**
Is there a risk of injury through spray-out? Do you need immediate leak indication and identification of acids?

**Reducing zoned hazardous areas**
Some customers use the argument that safety shields around pipe fittings reduce the size of the local zoned area.

**Concentration, temperature & pressure**
Whilst we would suggest all hazardous process lines are shielded, perhaps the first priority should be those above a certain concentration, pressure or temperature.

**Working at height**
Pipelines at height can be as dangerous as any other. But once again, the logistics of gaining access might mean that first priority goes to pipework up to head-height.

**Pipe Joint types**
Which specific pipe joints present sufficient risk? Flanges, valves, expansion joints, couplings, hoses?
SURVEY

Safety shields are made to fit specific flange & fitting sizes. As such, for retrofits, the next step is to perform a site survey. This is not rocket science, but it is important to get right first time.

Measurement and dimensions
Please refer to the Survey Guide in the appendix, this provides a full explanation of exactly which measurements to be recorded, along with examples of past surveys.

For standard flanges and simple valves, we just require pipe size and class (eg. 2”, 150lb) and a note of the valve type (ball, butterfly).

Shield location & process line
Measuring a flange is easy enough but fitting a box full of shields is impossible if you don’t know where they are supposed to go! We highly recommend recording specific areas and pipe-runs within the plant. If pipe-runs are complex, make additional notes (eg “caustic 2” line, running along floor from Tank No. CA10112)

Individual flange and shield identification?
Some customers create individual flange & shield ID tags. The ID schedule makes routine inspection and replacement orders much easier. We can supply individual tag numbers on the shield labels if requested.

Process information
For shield compatibility, it is critically important to note certain process information:

• Process liquid (eg. sulphuric, caustic, lube oil, fuel oil, steam, solvent etc)
• Concentration if applicable
• Maximum temperature
• Maximum pressure (unless you already state pipe class, eg. 150lb)

Surveying & Installing
If the surveyor knows he/she are also installing the shields, they will generally have a greater attention to detail, both in taking measurement and location information.

Drawings, photos and model/part numbers
We recommend that you take as much information as possible for non-standard items. Noting down model/part number can help us in identifying dimensions. Accompanying photographs or sketches are also very helpful.

Please refer to the Survey Guide in the appendix
SPECIFICATION & PROCUREMENT

With the information gained so far, we can now identify the right shielding solution for your application(s). Our comprehensive range of safety shield materials and designs means that we can provide solutions for almost any requirement, large or small, simple or complicated.

By completing the forms in the appendix, you are creating a comprehensive specification of requirements. If you have already chosen a specific shield type, simply return the survey forms and we will quote by return. If however, you would like us to make a recommendation on shield suitability, return all completed forms.

• Note: we recommend that the survey is performed before choosing a specific shield type. Steel shields cannot be fabricated to fit certain joint types, and elevated process temperature and pressure determines the suitability of some fabric shields.

• Note: Our growing service network enables us to perform survey and installation work on behalf of our clients. If you are interested in this, please contact either the local office nearest to you, or our head office in the UK.

We supply shielding solutions globally, either directly or through our growing network of local offices and partnerships.

INSTALLATION

The success of the install depends on the quality of the survey. Just dumping a large quantity of shields on your fitter’s desk will inevitably have poor results. Worst case, shields will be installed incorrectly or not at all.

We recommend that the installer should be the same person(s) who performed the survey. This way, they take ownership of the project and ensure that all shields are installed correctly.

Whilst installation of our shield range is simple, it is important to follow these guidelines:-

Refer to survey notes to ensure that shields are installed on the correct process lines. If a mixture of shield materials are purchased, make sure each type is installed on the correct process (PVC is not suitable for high corrosion lines, PTFE is not suitable for high pressure steam, etc).

Install shields on the specific flange / joint sizes for which they were intended. Whilst a PTFE shield for a 2” flange will fit a 1 ½”, this will result in a shield for a 1 ½” flange, that won’t fit!

Tie fabric shields correctly (as per installation instructions) and secure with a square or reef knot. Otherwise, the shield may loosen and eventually fall off.

For standard steel shields, do not necessarily pull the quick-connection clamp as tight as it will possibly go. Select one of the four slots that ensure a snug fit.
REVIEW

Like any other part of the plant, safety shields should be routinely inspected.

Pipe maintenance work inevitably results in shields being removed. Our shield designs allow simple removal and re-fitting with no special tools – but if they are not included within maintenance schedules, they may not be re-fitted.

Additionally, if early leak detection is important, regular shield inspection should be included within your maintenance planning.

Our PTFE shields are designed for corrosive applications. We use multi-layered PTFE coated fibreglass with central strengthening scrim. Thread for the stitching and all pull-cords are also PTFE. However, if acid is left to soak into the shield indefinitely, the material will be damaged. Therefore in the event of a leak, remember to remove the shield, clean it and then return to service.
THE FLANGE GUARDS DIFFERENCE - NOT ALL SHIELDS ARE THE SAME!

Our product materials are very carefully selected, with only the highest quality fabrics and shield designs used.

**QUALITY GUARANTEED**

Our PTFE shields use multi-layered, permeable Teflon coated fibreglass body, additional central Teflon strengthened scrim, all-PTFE thread and pull-cords. Our PTFE-Clear shield uses a transparent ECTFE central section. Other shield suppliers may use inferior, less expensive materials such as FEP, which tends to discolor and become cloudy in appearance. Our STEEL shield comprises three-layer steel mesh inner and simple quick-connection latch. All materials are 316 grade.

**BEST SERVICE**

We pride ourselves on giving best possible customer service, whether your requirement is big or small. Our expert team will provide guidance and recommendations. Largest Safety Shield stockholding in Europe, with a variety of designs and materials available for flange sizes from 15mm pipe size upwards. Quick delivery turn around for non-standard shield sizes and shapes.

**TESTED**

When you specify FLANGE GUARDS, you know all shield types have been extensively pressure tested on our leak-simulation test facility – and chemically tested against a range of process media. We recommend you check with your supplier, that the shield design being offered has been tested and is suitable for the process. Tell us about your specific requirement. In the last 25 years we have supplied shield solutions for hundreds of different process applications.

**FLEXIBLE**

Our comprehensive product range enables us to make shields for virtually any shape or purpose. Typically, flanges are the first pipe joint to be considered, but we can make shields for; valves (ball, butterfly, NRV, check, bonnet-style etc), couplings, elbows, tees, hose connections, expansion joints, pipe sections, pumps, heat exchanges, filters and the list goes on.
The information we need is simple, but it is important to take the correct measurements and other site/process information that will help to (a) identify most suitable shielding, and (b) enable the fitter to install the shields in the right place.

The following pages identify exactly what measurements and information is required. Our Self-Survey form is designed to be completed and returned to us for quotation or recommendation.

**TIPS:**

1. Pipelines will generally be made to standard sizes, according to process conditions. Knowing the pressure rating / class will make surveying quicker, but it is not a necessity.

2. For non-standard pipe joints/fittings, make a basic drawing or take a photo (if site conditions allow) and add dimensions.

3. For installation purposes, note the area you are in within the plant/site and the process (sulphuric, caustic, fuel oil etc). You can even note ID/tag numbers for specific tanks, pumps, valves. We can also tag the safety shields individually, if required.

4. If in doubt, ask us. We have over twenty five years’ experience and are always happy to make recommendations and clarify specific dimensions required. We can also perform site surveys on your behalf, ask your local representative for details.

5. Have a tape measure and ideally a pair of callipers. These make outside diameter measurement simple, otherwise circumference can be measured.
Here is a list of common applications;

**FLANGES**
For standard flange sizes, we simply need to know outside flange diameter, but also ideally the pipe size and width. You can either (1) physically measure these dimensions or (2) simply tell us the pipe size and flange rating:-

![Flange Diagram]

1. **PN16, DN40 / ANSI150lb, 2"**

   (for non-standard flange sizes, we prefer you to take manual measurement)

   We can make shields for non-circular flanges such as SAE oval and square shapes. However, unless you advise us otherwise we will assume flanges are circular. Refer to the Joint-Types section of our website for further information.

**VALVES**
We can make shields for virtually any valve configuration. Typical valve types include;

Ball, butterfly, swing-check, wafer-check, non-return, plug, bonnet, diaphragm

So for standard flanged Ball, Butterfly and Non-Return valves we simply need to know:-
1. Valve Type
2. Pipe Size
3. Flange Class (or if screw connection)

   Eg. Ball Valve, 50mm NB, PN25

Our shields will be made with cut-outs to accommodate valve handles and actuators. Unless you tell us otherwise, we will assume there’s a handle, centrally placed (apart from non-return valves, where generally there is no handle).

Some actuator structures are larger than others, so please provide as much information as possible if the valve is actuated, or if the handle is offset. See our valve shield quick-reference guide, Appendix V.

**OTHER JOINTS**
For anything else, measure all the dimensions that you think will be pertinent – bearing in mind that we need to make the shield big enough to wrap around the areas that need protection. See survey-samples for further details.

**ITEMS THAT WE CAN AND HAVE SHIELDED BEFORE:-**

- Expansion Joints / Bellows
- Couplings, Unions, Hose Connections, Elbows, Tees
- Whole Pipe Sections and Hose Lengths
- Heat Exchangers
- Whole Filters and Filter Tops
- Whole Pump Sets
- Flanges; SAE, Oval, Square, Extra-Wide, Non-Even
- Sight Glasses
- Flow Indicators and Meters
SELF SURVEY

Please complete the ‘Self Survey’ sheets on the following pages and return them to us for a quotation. Examples of these pages can be found on pages 15 - 17 in this document.
SELF SURVEY

COMPANY: ___________________________  CONTACT NAME: ___________________________
TEL: ___________________________  EMAIL: ___________________________
SITE: ___________________________

DRIVER / REASON FOR SHIELDS
Briefly explain the reason why shields are being considered. Perhaps it is as a result of an accident/incident, insurance or regulatory requirement, corporate directive, hazardous area zoning. This information helps us to identify the correct solution for you.

PURPOSE:
Tell us what you expect from the shield. Typically the main purpose is to prevent spray-out but not contain the leak. However, your requirement may be different. Perhaps oil mist is the main concern, or to provide visual leak indication. Alternatively you may need to contain the leak and divert through drains.

SCOPE:
List specific process lines requiring shields, (eg. 98% sulphuric acid, lubrication oil) and where appropriate, tell us the process temperature and pressure (hydraulic oil at 100Bar pressure / Thermal oil at 250°C).
## SELF SURVEY

CUSTOMER: ___________________________ AREA: ___________________________

SITE: ________________________________

PAGE # OF DATE: ______________________

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**Return your survey to us for quotation, www.flangeguards.com**

Dimensions measured in mm

(Unless otherwise stated)

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<table>
<thead>
<tr>
<th>Location / Notes</th>
<th>Joint Type</th>
<th>Item No.</th>
<th>Quantity</th>
<th>Pipe</th>
<th>Flange</th>
<th>Bonnet ø</th>
<th>Height</th>
<th>Handle Cut out ø</th>
<th>Comments</th>
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<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

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The Flangeguard Guidebook, Total Shield Solutions

13
SELF SURVEY

COMPANY: ABC CHEMICALS
TEL.: +49 000 000 00
SITE: FRANKFURT

CONTACT NAME: FRED
EMAIL: FRED@ABC.COM

DRIVER / REASON FOR SHIELD:
Briefly explain the main driver why a shield is being considered. Perhaps it is as a result of an accident/incident, insurance or regulatory requirement, corporate directive, hazards, area zoning. This information helps us to identify the correct solution for you.

CORPORATE DIRECTIVE FOLLOWING NEAR-MISS ON A DIFFERENT SITE.

PURPOSE:
Tell us what you expect from the shield. Typically the main purpose is to prevent spray-out but not contain the leak. However, your requirement may be different. Perhaps oil mist is the main concern, or to provide visual leak indication. Alternatively you may need to contain the leak and divert through drains.

PREVENT SPRAY-OUT AND PROVIDE LEAK INDICATION

SCOPE:
List specific process lines requiring shields, e.g. 80% sulphuric acid, lubrication oil, and where appropriate, tell us the process temperature and pressure (hydraulic oil @ 100Bar pressure / Thermal oil @ 250°C).

1) 47% CAUSTIC SOLUTION
2) FUEL OIL

The Flangeguard Guidebook, Total Shield Solutions.
# SELF SURVEY

**CUSTOMER:** ABC CHEMICALS  
**SITE:** FRANKFURT  
**PAGE:** 2 of 3  
**DATE:** 8/6/2015

### SELF SURVEY

<table>
<thead>
<tr>
<th>Customer</th>
<th>Location</th>
<th>Description</th>
<th>Notes</th>
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<td>FRANKFURT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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## Flange Guard Guidebook, Total Shield Solutions

### Flange Guards

1. **Flange Guard** 1.01
   - Material: 15
   - Flange: 150
   - PN 16

2. **Flange Guard** 1.02
   - Material: 15
   - Flange: 15
   - PN 16

3. **Flange Guard** 1.03
   - Material: 15
   - Flange: 95
   - PN 16

4. **Ball Valve** 1.04
   - Material: 40
   - Flange: 150
   - PN 16

5. **Ball Valve** 1.05
   - Material: 40
   - Flange: 150
   - PN 16

---

### Fuel Lines from Storage Tank

1. **Fuel Line** 1.06
   - Material: 25
   - Flange: 115
   - PN 16

2. **Fuel Line** 1.07
   - Material: 25
   - Flange: 115
   - PN 16

3. **Fuel Line** 1.08
   - Material: 80
   - Flange: 200
   - PN 16

---

### Fuel Lines to Generator Room

1. **Fuel Line** 2.01
   - Material: 150
   - Flange: 300
   - PN 40

2. **Fuel Line** 2.02
   - Material: 150
   - Flange: 300
   - PN 40

3. **Expansion Bellows** 2.03
   - Material: 20
   - PN 95

4. **Special Valve** 2.04
   - Material: |

5. **Hose** 2.05
   - Material: |

---

Return your survey to us for quotation: www.flangeguards.com  
(Other FlangeGuard products may be applicable.)

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The FlangeGuard Guidebook, Total Shield Solutions

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The FlangeGuard Guidebook, Total Shield Solutions
SELF SURVEY

CUSTOMER: ABC CHEMICALS
SITE: HANKART
AREA: POWER PLANT

PAGE # 3 OF 3 DATE: 8/6/2015

2.04 BALL VALVE & NON-RETURN
VALVE IN SERIES
3.5mm 20-00 15mm Ø

150

3 3.4mm

12.5mm

2.05 HOSE & FLANGES

Note: All Flanges ARE SAME SIZE

NOTE: NOT SURE IF STANDS REQUIRED FOR FLANGES—ONLY OR ALSO HOSE. SO MEASURED EVERYTHING

Return your survey to us for quotation, www.flangeguards.com
# VALVE SHIELDS - QUICK REFERENCE

A wide variety of valve designs, sizes and configurations exist. We can tailor our shields to exactly fit any valve but common configurations are listed below, showing shield shape and fit. This information is useful during the survey, to identify the measurements required.

<table>
<thead>
<tr>
<th>Valve with shield installed</th>
<th>shield shape &amp; pull-cords uninstalled (not to scale)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Ball Valve with central handle" /></td>
<td><img src="image" alt="Ball Valve with central handle" /></td>
<td><strong>Ball Valve with central handle</strong>&lt;br&gt;One-piece shield, central cut-out</td>
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<tr>
<td><img src="image" alt="Ball Valve with offset handle" /></td>
<td><img src="image" alt="Ball Valve with offset handle" /></td>
<td><strong>Ball Valve with offset handle</strong>&lt;br&gt;One-piece shield, offset cut-out</td>
</tr>
<tr>
<td><img src="image" alt="Ball Valve with actuator" /></td>
<td><img src="image" alt="Ball Valve with actuator" /></td>
<td><strong>Ball Valve with actuator</strong>&lt;br&gt;One-piece shield, larger cut-out</td>
</tr>
</tbody>
</table>
BUTTERFLY VALVE
One-piece shield,

BONNET-STYLE VALVE
Three-piece shield, two standard flange shields and one tapered bonnet shield

GATE-STYLE VALVE
Three-piece shield, as top flange sits proud of bottom flanges

DIAPHRAGM VALVE
One-piece shield, as top flange sits within diameter of bottom flanges
The following tables are listed to assist with identification of flange dimensions. The first pair of tables (metric and imperial) express flange diameters for any given pipe size and pressure rating.

### METRIC FLANGE DIAMETERS

<table>
<thead>
<tr>
<th>Pipe Dia.</th>
<th>PN6</th>
<th>PN10</th>
<th>PN16</th>
<th>PN25</th>
<th>PN40</th>
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## FLANGE TABLES

### IMPERIAL FLANGE DIAMETERS

<table>
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