Field of Application

This checklist can be used subject to the following conditions:

- It is a roll mill with a roller diameter of < 400 mm with 2 horizontally arranged rollers (see Fig. 1).
- The roll mill was placed on the market in accordance with the standard DIN EN 1417:2015 “Plastics and rubber machines – Two roll mills – Safety requirements”

Note: In individual cases, safety requirements are specified that deviate from the standard but which have proven themselves in practice and are recommended by the Sachgebiet Maschinen der chemischen Industrie (hereinafter referred to as SG).

Instructions for Using the Checklist

The checklist only deals with the safety requirements for the roll mill. The environment of the machine, interactions with other machines, etc. and additional company-specific measures (e.g. instruction of employees) are not dealt with.

The checklist can be used when the manufacturer hands a new machine over to the operator or as part of the risk assessment. By differentiating the requirements according to the year of manufacture of the machine, the fact is taken into account to what extent an adaptation to the state of the art is required. In doing so, the “proportionality”, as stated in the recommendation on operational safety (EmpfBS [Recommendation on operational safety] 1114 of March 2018) of the Federal Ministry of Labour and Social Affairs (BMAS), is also taken into account.

Note: When carrying out risk assessments in accordance with Section 3(7) of the Ordinance on Industrial Safety and Health, it must be taken into account that the state of the art must be applied to the measures to be taken. The current version of the European harmonised standard for roll mills (DIN EN 1417) was published in Germany in March 2015. The results in the necessity to reassess the measures taken so far as part of the risk assessment.

A generally accessible current overview of the standards can be viewed at:


Other Checklists

Safety requirements for electrical, hydraulic and pneumatic equipment are not covered by this checklist. It is therefore recommended to use the corresponding BG RCI (Statutory Accident Insurance for the Raw Materials and Chemical Industry) checklists for DGUV (German Statutory Accident Insurance Association) Information 213-054 for these areas:

- For the electrical system T 008-3
- For the hydraulic system T 008-4
- For the pneumatic system T 008-5
- For other protective devices T 008-1A
Fig. 1: Roll mill with roller diameter $D = 150$ mm. The roller intake gap is secured by separating protective equipment in combination with protective equipment reacting to contact (safety edges).

Fig. 2: Arrangement of the protective equipment for roll mills in rubber processing.
Fig. 3: Arrangement of the protective equipment for roll mills in plastics processing

- Feed funnel with rocker switch with following safety functions:
  - Stopping the roller rotation
  - Spreading of the rolls

- Switch bracket (front and rear) with following safety functions:
  - Stopping the roller rotation
  - Spreading of the rolls

Top of grid > 1600 mm above standard surface
Emergency opening 50 mm

The distance between two struts must not exceed 25 mm.

Fig. 4: Roll mill with rocker switch on the feed funnel and switch bracket on the roller
Fig. 5: Distance dimensions according to DIN EN 1417:2015-03. The dimension "$g$" = 29.86 mm (reach-through width for the hand) leads to frequent false tripping of the protective equipment. The remaining working area on the roller (white arrow), e.g. for winding the material, is small.
Fig. 6: Field-proven arrangement of electro-sensitive protective equipment (ESPE)

**Picture credits:**
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The pictures shown here were kindly provided by

**Fig. 1: DEGUMA-Schütz GmbH, Geisa**
**Fig. 2: Servitec Maschinen service GmbH, Wustermark**
**Fig. 3: Servitec Maschinen service GmbH, Wustermark**
**Fig. 4: Servitec Maschinen service GmbH, Wustermark**
**Fig. 5: Principle picture by Sachgebiet Maschinen der chemische Industrie**
**Fig. 6: Servitec Maschinen service GmbH, Wustermark**
Annexes
Checklist
Report on the checklist

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We have contributed to the development of this short information sheet of the DGUV:

- Berufsgenossenschaft Rohstoffe und chemische Industrie
- Berufsgenossenschaft Holz und Metall
- Verwaltungs-Berufsgenossenschaft
- Deutsches Institut für Normung
- Verband Deutscher Maschinen- und Anlagenbau
- Wirtschaftsverband der deutschen Kautschukindustrie e. V.
- ADT-Zielke GmbH & Co. KG
- BASF
- Bayer AG
- Continental AG
- Currenta GmbH & Co. OHG
- DEGUMA-Schütz GmbH
- Harburg-Freudenberg Maschinenbau GmbH
- Klöckner Pentaplast GmbH
- Reifenhäuser Group
- Servitec Maschinenservice GmbH
- Vibracoustic GmbH
# Protection Device for the Roller Intake Gap

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Requirement</th>
<th>Year of Manufacture</th>
<th>Notes / Explanations / Alternatives</th>
<th>Assessment/result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DIN EN 1417-2015 5.2.3.1 and 5.2.3.2</td>
<td><strong>Basic Requirements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) Is the height of the top edge of the roller at least 1100 mm?</td>
<td>X</td>
<td>X</td>
<td>a) Heights ranging from 1100 mm to 1350 mm have proven themselves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Is the roller intake gap secured by a combination of fixed separating equipment, electro-sensitive protective equipment (ESPE) and protective equipment that is tripped by contact (e.g. switch brackets or safety edges)?</td>
<td>X</td>
<td>X</td>
<td>b) According to DIN EN 1417 the protective equipment must be arranged and designed in such a way that - the fixed separating equipment complies with DIN EN ISO 13857 (no accessibility to the intake gap due to large safety distances). - interlocked separating protective equipment complies with DIN EN 13855 (quick stop under consideration of the approach speed). If this is not possible, solenoid interlocks must be used. In practice, however, compliance with the limit values from the above-mentioned standards leads to frequent false tripping of the protective equipment. In addition, only a small working area on the rollers is left free for manual intervention (e.g. winding of the material), which results in a high incentive for manipulation, which often leads to the operator dismantling the protective device. Smaller safety clearances (than required by the standard) therefore increase safety, as manipulation incentives are eliminated. Slot-shaped openings may have a maximum distance of 25 mm. This dimension is required in order to be able to add mixture components easily and without loss. <strong>Figure 5</strong> shows an example of the problematic distance dimensions (sizes) as specified in the standard. In particular, the dimension &quot;g&quot; from the standard in practice leads to frequent false tripping of the protective equipment (e.g. with &quot;stiff&quot; rubber compounds).</td>
</tr>
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<tr>
<td>2</td>
<td>DIN EN 1417-2015 5.2.3.3 and 5.2.1.1</td>
<td>Is the separating protective equipment that prevents access from above to the intake gap designed in accordance with DIN EN 13857:2008?</td>
<td>(X)</td>
<td>The implementation of this requirement means that the protective equipment must also maintain the safety distances against “reaching over” and “reaching through” slot-shaped openings. For the usual dimensions of rolling mills, the application of the standard results in a height of the separating protective equipment of up to 2 m. Ergonomic working is not possible with this dimension. It is therefore permissible to deviate from the dimensions given in the standard if a comparable level of safety is achieved through additional measures (e.g. safety edge or rocker switch on the top edge) (see Fig. 2, 3, 5).</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DIN EN 1417-2015 5.2.3.3</td>
<td>Are the following requirements met when using electro-sensitive protective equipment (ESPE)?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>a) Is the electro-sensitive protective equipment (ESPE) only used for access from above?</td>
<td>X</td>
<td>X</td>
<td>a) According to the standard, access from above must only be secured by separating equipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Does the ESPE comply with DIN EN 61496, type 4?</td>
<td>X</td>
<td>X</td>
<td>b) The required ESPE type meets the highest requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Is the ESPE arranged according to DIN EN 13855:2010?</td>
<td>(X)</td>
<td>(X)</td>
<td>c) The application of the standard results in very small distances between the ESPE and the roller surface. In practice, these dimensions can only be implemented in exceptional cases, as they lead to frequent false tripping. Fig. 6 shows an arrangement that has proven itself in practice.</td>
</tr>
<tr>
<td>4</td>
<td>DIN EN 1417-2015 5.2.1.1</td>
<td>Rear of the roll mill</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Are protective devices also provided at the rear of the roll mill?</td>
<td>X</td>
<td>X</td>
<td>The same protective equipment must be provided as on the operator side.</td>
</tr>
<tr>
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<tr>
<td>5</td>
<td>DIN EN 1417-2015 5.2.3.3.2</td>
<td>Safety functions of the interlocked protective equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) Braking of the rollers:</td>
<td>before 03/2015</td>
<td>(X) The braking angle is determined at maximum speed without material. The value from the standard does not correspond to the state of the art. The following braking angles are required for new roll mills:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is the braking angle less than 60°?</td>
<td>from 03/2015</td>
<td>&lt; 30 ° for roll mills 400 mm &gt; D ≥ 200 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 20 ° for roll mills D &lt; 200 mm</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>These values can be achieved with an electronically controlled drive, for example. If the electronic system fails, the second braking system must at least reach a value of &lt; 60 °. This value is required in DIN EN 1417.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>b) Spreading of the rollers:</td>
<td></td>
<td>(b) In the case of new roll mills, spreading of the rollers is always required in addition for braking the rollers. Implantation is only needed in new roll mills. Automatic reversing is not recommended, as it is possible to simultaneously reach into both the infeed and outfeed side. The following function must be retrofitted in roll mills manufactured before 03/2015 that are not equipped with power-operated spreading of the rollers:</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>Does the spreading take place to a minimum gap width of 50 mm within 5 seconds?</td>
<td></td>
<td>After triggering the safety function “braking”, it must be possible to carry out distance-controlled reversing in jog mode in order to quickly free parts of the body (e.g. a hand caught in the rollers). The roller movement must be switched off automatically as soon as a maximum rotation of 45 ° is reached. A further rotation of 45 ° is permissible, but must again be manually initiated by the operator.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DIN EN 1417-2015 5.2.1.2</td>
<td>What to do in case of a power failure</td>
<td></td>
<td>At least one braking system that meets proven principles is considered necessary for roll mills built before 03/2015. This includes in particular the &quot;closed-circuit current principle&quot;, according to which the braking function remains effective even in the event of a power failure.</td>
<td></td>
</tr>
</tbody>
</table>
### Technical control-related requirements

<table>
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<tr>
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<tbody>
<tr>
<td>7</td>
<td>DIN EN 1417-2015 5.2.3.3.2</td>
<td>Dual-channel capability for roller stop</td>
<td>before 03/2015</td>
<td>(X) DIN EN 1417 requires that the safety function &quot;braking of the rollers&quot; must be implemented with PLr = d. In addition, the implementation of category 3 according to DIN EN 13849-1 is required. This makes it clear that dual-channel capability is necessary. For roll mills manufactured from 03/2015, this means: Two independent braking systems are mandatory. Deviating from DIN EN 1417, they can also consist of an electronic braking system and a spring-loaded mechanical brake. Two electronic systems are also permissible when PLr = d is achieved. If the first braking system fails, the second system must achieve a braking angle of &lt; 60 °. <strong>Note:</strong> DIN EN 1417 excludes electronic braking systems. The maximum caster angle must be maintained even if an electronic braking system fails and if a power failure occurs. For roll mills manufactured before 03/2015, dual-channel capability is limited to signal processing. A braking system (e.g. spring-loaded electromagnetic brake), which has been designed applying proven principles (e.g. function is maintained even in case of power failure), must be in place.</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>DIN EN 1417-2015 5.2.3.3.2</td>
<td>Measuring system for the braking angle</td>
<td>before 03/2015</td>
<td>X The measuring system must have the following properties:  - Automatic measurement at least once per week  - Measurement of the castor angle  - Blocking the roll mill drive by the controller if the angle is too large  The measuring device must be checked every 4 years. The following applies to roll mills manufactured before 03/2015: The brake must be checked once a day or before each use.</td>
<td></td>
</tr>
</tbody>
</table>
Report on the checklist

- Updating the risk assessment (adapting to the state of the art)
- Part of the acceptance report between manufacturer and operator (first inspection)

Machine type:  
Year of manufacture:  
Manufacturer:  
Date/place of the inspection:  
Name of the examiner(s):  

The assessment was based on the following checklists

- for roll mills  
- for electrical system T008-3  
- for hydraulic system T008-4  
- for pneumatic system T008-5  

Summary assessment of the results of the inspection:

- the machine has minor defects, start-up/continued operation can take place
- the machine has major defects, start-up/continued operation can only take place after the defects have been rectified

Manufacturer's signature  
Operator's signature  

Roll mills checklist D < 400 mm  
As of: 10/2018