

Data sheet: S3

Bar and structural products

Profiles, dimensions & tolerances

Introduction

ArcelorMittal South Africa, Vereeniging Works produces a wide variety of long and forged products. Products are available in various sizes of round bar, square sections with round corners, flats, structural profiles and special profiles.

Sizes from 10.5mm up to 103mm in diameter are hot rolled while sizes from 90mm to 250mm are forged on a GFM long forging machine. Sizes from 220mm up to 890mm in diameter or equivalent sections are produced on forging presses.

The sizes available will vary according to the product and to the facility used to produce it.

The purpose of this data sheet is to list the sizes and tolerances applicable to these sizes.

The following tables represent available standard sizes. Sizes not included may, however, be available subject to enquiry.

- *For specific information relating to the production facilities, Steel grades and other products at ArcelorMittal South Africa, Vereeniging Works: Refer to data sheets listed below*
 - ArcelorMittal VN S1 Production Facilities
 - ArcelorMittal VN S2 Steel Grades
 - **ArcelorMittal VN S3 Profiles**
 - ArcelorMittal VN S4.1 Forge Facilities
 - ArcelorMittal VN S4.2 Forged Products
 - ArcelorMittal VN S4.3 Forged ingots blooms billet
 - ArcelorMittal VN S5 Seamless Tubes
 - ArcelorMittal VN V1.1 Standard Window Profiles
 - ArcelorMittal VN V1.2 Light Window Profiles
 - ArcelorMittal VN V2.1 Fencing Profiles
 - ArcelorMittal VN V2.2 Afri-post
 - ArcelorMittal VN V2.3 Palisades

For further information, contact:

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Standard lengths (All profiles)

Standard lengths are available in steps of 100 mm in the range of 3 to 13 meters, with the exception of the limitations listed below. Lengths shorter than 5m in as-rolled condition only available for >25mm diameter.

Conditions for standard lengths

Length extras are charged if the following conditions can't be accepted as part of the order:

5% Shorts acceptable (carbon steel)

Up to 5% of the ordered mass can be supplied in random short lengths from 3 metres up to the ordered length. Orders to be endorsed "5% shorts acceptable".

10% Shorts acceptable (alloy steel)

Up to 10% of the ordered mass can be supplied in random short lengths from 3 metres up to the ordered length. Orders to be endorsed "10% shorts acceptable".

Multiples

Lengths shorter than 5m in as-rolled condition only available for >25mm diameter.

The shortest specified length that can be ordered is 4 metres. Orders must be endorsed "Multiples" quoting the multiple lengths. Final lengths consisting of several multiples will be supplied within a cutting tolerance of -0.0mm - +50mm overall. Customer must be prepared to accept up to 10% of the bars shorter than 4 metres but these will be supplied in multiples as requested.

Notes

- Notwithstanding any lengths quoted in the table for length limitations, the maximum length that can be supplied:
 - Normalised or annealed condition is 7 meters if straightening, final inspection and NDT is required
 - Hardened and tempered condition 6 meters
- The maximum length that can be tested for surface cracks by magnetic crack detection is 7 metres.
- The standard cutting tolerance on mill-cut lengths is -0.0mm +50mm.
- Stricter cutting tolerances are available on request.

Straightness tolerance

A commercial straightness tolerance of 5mm maximum deviation over 1 meter will apply.

When the order is endorsed "special straightening" in which case the maximum deviation will be 2.5mm over 1metre (Round bar only). This is only available for diameters over 22mm and lengths up to 7 metres maximum.

Hot rolled rounds: kg/m and tolerances

| Φ Size mm | Mass kg/m | Tolerance (mm) | | | Available as coils or straight bars |
|--------------|--------------|----------------|--------------|-----------|-------------------------------------|
| | | Commercial | Bolt & chain | SS 10/301 | |
| 10.5 | 0.68 | ± 0.25 | ± 0.25 | ± 0.18 | Coils only |
| 11.0 | 0.75 | " | " | " | " |
| 11.5 | 0.82 | " | " | " | " |
| 12.0 | 0.88 | " | " | " | " |
| 12.5 | 0.96 | " | " | " | " |
| 13.0 | 1.04 | " | " | " | " |
| 13.5 | 1.12 | " | " | " | " |
| 14.0 | 1.21 | " | " | " | " |
| 14.5 | 1.30 | " | " | " | " |
| 15.0 | 1.39 | " | " | " | " |
| 15.5 | 1.48 | " | " | " | " |
| 16.0 | 1.58 | ± 0.30 | " | " | Coils and Straight Bar |
| 16.5 | 1.68 | " | " | ± 0.21 | " |
| 17.0 | 1.78 | " | " | " | " |
| 18.0 | 2.00 | ± 0.30 | ± 0.25 | " | " |
| 18.5 | 2.11 | " | " | " | " |
| 19.0 | 2.23 | " | " | " | " |
| 20.0 | 2.47 | " | " | " | " |
| 20.5 | 2.59 | " | ± 0.30 | ± 0.25 | " |
| 21.5 | 2.85 | " | " | " | " |
| 22.0 | 2.98 | " | " | " | " |
| 23.0 | 3.26 | " | " | " | " |

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| Φ | Size mm | Mass kg/m | Tolerance (mm) | | | Available as coils or straight bars |
|---------|---------|-----------|----------------|--------------|-----------|-------------------------------------|
| | | | Commercial | Bolt & chain | SS 10/301 | |
| 23.5 | 3.40 | | ± 0.30 | ± 0.30 | " | " |
| 24.0 | 3.55 | | " | " | " | " |
| 24.5 | 3.70 | | " | " | ± 0.28 | " |
| 25.0 | 3.85 | | " | " | " | " |
| 26.0 | 4.17 | | " | " | " | " |
| 26.5 | 4.33 | | " | " | " | " |
| 27.0 | 4.49 | | " | " | " | " |
| 28.0 | 4.84 | | " | " | " | " |
| 28.5 | 5.00 | | " | " | " | " |
| 30.0 | 5.55 | | ± 0.45 | ± 0.35 | ± 0.33 | Straight Bar only |
| 32.0 | 6.31 | | " | ± 0.50 | " | " |
| 33.5 | 6.92 | | " | " | ± 0.41 | " |
| 34.0 | 7.12 | | " | " | " | " |
| 35.0 | 7.55 | | " | " | " | " |
| 36.0 | 7.99 | | " | " | " | " |
| 36.5 | 8.20 | | " | " | " | " |
| 37.0 | 8.44 | | " | " | " | " |
| 38.0 | 8.90 | | " | " | " | " |
| 39.0 | 9.37 | | " | " | " | " |
| 40.0 | 9.85 | | ± 0.60 | " | ± 0.46 | " |
| 42.0 | 10.9 | | " | " | " | " |
| 43.0 | 11.4 | | " | " | " | " |
| 45.0 | 12.5 | | " | " | ± 0.56 | " |
| 46.5 | 13.3 | | " | " | " | " |
| 48.0 | 14.2 | | " | " | " | " |
| 50.0 | 15.4 | | " | " | " | " |
| 51.5 | 16.34 | | " | " | " | " |
| 52.0 | 16.65 | | " | " | " | " |
| 53.0 | 17.3 | | " | " | " | " |
| 54.0 | 18.0 | | ± 0.80 | " | " | " |
| 55.0 | 18.7 | | " | " | " | " |
| 58.0 | 20.7 | | " | " | " | " |
| 60.0 | 22.2 | | " | " | " | " |
| 63.0 | 24.5 | | " | " | " | " |
| 64.0 | 25.23 | | ± 1.20 | " | ± 0.64 | " |
| 65.0 | 26.0 | | " | " | ± 0.64 | " |
| 68.0 | 28.5 | | " | " | " | " |
| 70.0 | 30.2 | | " | " | " | " |
| 73.0* | 32.9 | | " | " | " | " |
| 75.0* | 34.7 | | " | " | " | " |
| 78.0* | 37.5 | | ± 1.57 | " | " | " |
| 80.0* | 39.5 | | " | " | " | " |
| 85.0 | 44.5 | | " | " | " | " |
| 90 -103 | | | " | " | " | " |

*Bottom poured or Newcastle input material only

NOTE: Out of roundness tolerance is equal to a maximum of 75% of the total tolerance.

Standard lengths Rounds

| Φ Size (mm) | Ingot route | | | B/M route | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Group 1 (m) | Group 2 (m) | Group 3 (m) | Group 1 (m) | Group 2 (m) | Group 3 (m) |
| 68 | 5.20 | 6.20 | 7.80 | 4.40 | 5.80 | 7.00 |
| 70* | 5.00 | 6.00 | 7.50 | 5.50 | 6.50 | 8.20 |
| 73* | 5.50 | 6.70 | - | 5.00 | 6.00 | - |
| 75* | 5.20 | 6.50 | 8.60 | 4.10 | 5.80 | 7.20 |
| 78* | 5.20 | 6.50 | - | 4.80 | 6.00 | - |
| 80* | 4.60 | 5.60 | 7.50 | 5.00 | 6.40 | 8.50 |
| 85* | 5.10 | 6.70 | 10.00 | 4.50 | 5.60 | 7.50 |

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Rolled Round cornered squares: kg/m and Tolerances

| Size (mm) | Mass (kg/m) | Approximate corner radius (mm) | Rolling tolerance (± mm) |
|-----------|-------------|--------------------------------|--------------------------|
| 35.0 | 9.57 | 4.50 | 0.43 |
| 40.0 | 12.51 | 5.00 | 0.50 |
| 45.0 | 15.83 | 5.50 | 0.56 |
| 50.0 | 19.54 | 6.25 | 0.63 |
| 55.0 | 23.66 | 6.75 | 0.64 |
| 60.0 | 28.14 | 7.50 | 0.75 |
| 65.0 | 33.03 | 8.00 | 0.80 |
| 70.0* | 38.30 | 8.75 | 0.88 |
| 75.0* | 44.15 | 9.13 | 0.92 |
| 80.0* | 50.03 | 10.00 | 1.00 |
| 85.0* | 56.90 | 11.25 | 1.08 |
| 92.1* | 66.20 | 11.25 | 1.10 |
| 101.6* | 78.52 | 15.00 | 2.00 |

*Bottom poured or Newcastle input material only

Standard lengths: Round cornered squares

| Size (mm) | Variable length (m) | | | | | |
|-----------|---------------------|------|-------|----------------|------|-------|
| | Ingot route 950 | | | B/M route 1050 | | |
| 85* | 5.50 | | 8.00 | 6.00 | 9.00 | |
| 80* | | 6.00 | 9.00 | 5.10 | 7.00 | 10.00 |
| 75* | 5.20 | 7.00 | 10.50 | 5.80 | 7.50 | 11.60 |
| 70* | | 6.00 | 8.00 | 5.50 | 6.50 | 9.00 |
| 65 | 5.50 | 7.00 | 9.00 | 5.10 | 6.20 | 7.60 |
| 60 | 5.40 | 6.40 | 8.00 | 6.00 | 7.20 | 9.00 |
| 55 | 6.50 | 7.80 | 9.60 | 6.10 | 7.20 | 8.50 |

*Bottom poured or Newcastle input material only

Hot-rolled flats: Available sizes and kg/m

| Thickness (mm) | Width (mm) | | | | | | | |
|----------------|------------|------|------|-------|------|------|------|------|
| | 44.5 | 50 | 50,8 | 57.15 | 60 | 63.5 | 65 | 70 |
| 6 | 2.03 | 2.29 | 2.33 | | 2.76 | 2.93 | 3.00 | 3.23 |
| 6.5 | 2.23 | | | | | | | |
| 7 | 2.36 | 2.66 | | | 3.21 | 3.40 | 3.49 | 3.76 |
| 7.4 | 2.54 | | | | | | | |
| 8 | 2.68 | 3.03 | 3.08 | 3.48 | 3.66 | 3.88 | 3.97 | 4.28 |
| 9 | | 3.39 | | 3.90 | 4.10 | 4.35 | | 4.80 |
| 9.1 | 3.14 | | | | | | | |
| 10 | | 3.75 | | 4.31 | 4.54 | 4.81 | 4.93 | 5.32 |
| 11 | | 4.11 | | | 4.97 | 5.27 | | 5.83 |
| 12 | | 4.46 | | | 5.40 | 5.73 | | 6.34 |
| 13 | | 4.81 | | | 5.83 | 6.19 | | 6.85 |
| 14 | | 5.16 | | | 6.26 | | | 7.36 |
| 15 | | | | | 6.68 | | | 7.86 |
| 16 | | 5.84 | | 6.74 | 7.10 | | | |
| 17 | | | | | 7.53 | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | 7.67 | | | | | | |

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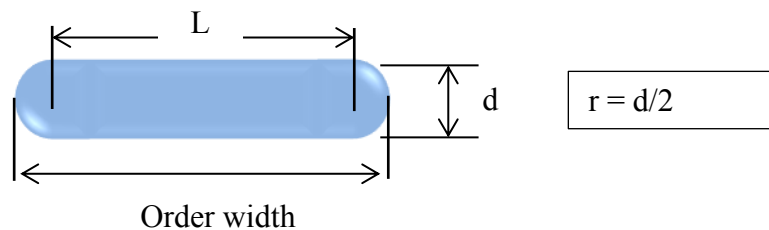
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Continue.....

| Thickness (mm) | Width (mm) | | | | | | | | |
|----------------|------------|------|-------|-------|-------|-------|-------|-------|-------|
| | 75 | 76.2 | 80 | 90* | 100* | 103* | 120* | 130** | 150** |
| 6 | | 3.53 | | | | | | | |
| 7 | | | 4.31 | | | | | | |
| 8 | | 4.67 | 4.91 | 5.54 | 6.17 | | | | |
| 9 | | 5.24 | 5.51 | 6.22 | 6.92 | | | | |
| 10 | 5.71 | 5.81 | 6.11 | 6.89 | 7.67 | | | 10.20 | 11.80 |
| 11 | 6.27 | 6.37 | 6.70 | 7.56 | 8.42 | | | 11.00 | 12.70 |
| 12 | 6.82 | 6.93 | 7.29 | 8.23 | 9.17 | | | 12.30 | 14.20 |
| 12.7 | | | | | | 10.15 | | | |
| 13 | 7.36 | 7.48 | 7.89 | 8.89 | 9.91 | | | | |
| 14 | 7.90 | 8.04 | 8.45 | 9.55 | 10.65 | | 13.20 | 14.30 | 16.50 |
| 15 | | | 9.03 | 10.21 | 11.38 | | 14.15 | | |
| 16 | | 9.13 | 9.61 | 10.86 | 12.12 | | 15.09 | 16.30 | 18.80 |
| 18 | | | | | | 14.43 | 16.98 | 18.35 | 21.21 |
| 20 | | | | 13.44 | 15.01 | | 18.86 | | 23.60 |
| 21 | | | 13.21 | | | | 19.81 | | |
| 22 | | | | 15.25 | 16.94 | | | | |
| 23 | | | | 15.94 | 17.71 | | 21.65 | | |
| 24 | | | | 16.63 | 18.48 | | | | |
| 25 | | | | 17.67 | 19.61 | 20.23 | 23.58 | 25.50 | 29.50 |

* 90 up to 120mm widths are supplied to uncontrolled corner radius.
 ** 130 and 150mm widths are rolled from square edged pass design.

Calculation of kg/m for flats: (Round cornered)



$$\text{Kg/m} = (\text{Corner area} + \text{rectangular area}) \times \text{density}$$

$$\text{Kg/m} = ((\pi r^2) + (L \times d)) \times 7.85$$

Standard tolerances: Flats (applicable to standard and non-standard sizes)

| Nominal width (mm) | Width tolerance (mm) |
|--------------------|----------------------|
| 44.5 – 50.8 | ± 0.30 |
| >50.8 - 80 | ± 0.50 |
| Nominal width (mm) | Width tolerance (mm) |
| 80.0 – 100.0 | +0.76 |
| | -0.38 |
| >100.0 - <120.0 | +1.00 |
| | -0.50 |
| 120.0 – 150.0 | +1.2 |
| | -0.76 |

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| Nominal Width (mm) | Thickness tolerance (mm) | | |
|--------------------|--------------------------|--------|-------|
| | < = 10 | > 10 | |
| 44.5 -80.0 | ± 0.15 | ± 0.20 | |
| Nominal Width (mm) | Thickness tolerance (mm) | | |
| | < = 8 | > 8-16 | >16 |
| 80.0 – 150.0 | +0.38 | +0.38 | +0.51 |
| | -0.13 | -0.26 | -0.38 |

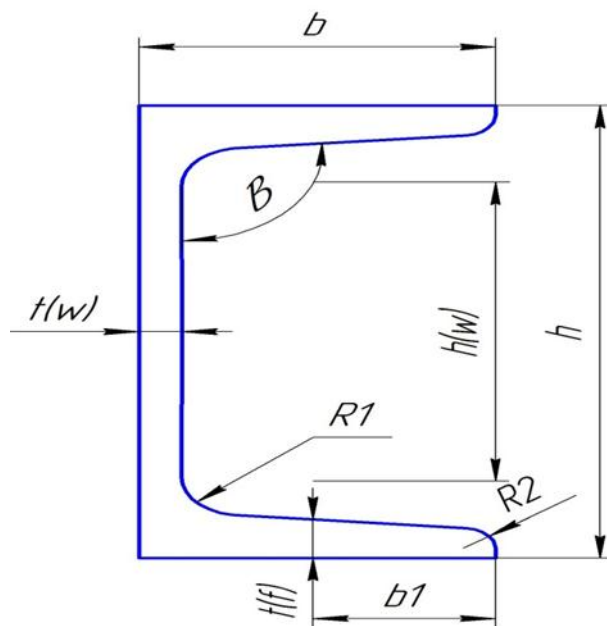
Concavity in measured according to DIN 4620, superseded by EN 10092, SAEJ1123, SAET510 & ASTM-A689 (Applicable to standard and non-standard sizes)

| Width (mm) | Thickness | |
|------------|------------|------------|
| | < = 10 mm | > 10 mm |
| 44.5-50.8 | 0.15mm max | 0.15mm max |
| 55-80 | 0.15mm max | 0.20mm max |
| 90-100 | 0.20mm max | 0.30mm max |
| 130-150 | 0.40mm max | 0.40mm max |

Special purpose carbon and structural steel

Channels (not available in mild steel)

| Designation | m | h | b | t _w | t _f | r ₁ | r ₂ | b ₁ | h _w | β | Δb Flanges | Δt _f Flanges |
|-----------------|------|-------------------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----|------------|-------------------------|
| mm x mm | kg/m | mm | mm | mm | mm | mm | mm | mm | mm | ° | mm | mm |
| C 76 x 38 | 6.7 | 76.2 ± 2 | 38.1 ± 1.6 | 5.0 ± 0.5 | 6.8 ± 0.5 | 7.6 | 2.4 | 17 | 46 | 95 | 0.7 max | 0.7 max |
| C 76 x 38 Light | 5.7 | 76.2 + 3.2 - 0.0 | 38.1 ± 1.6 | 4.0 ± 0.5 | 5.8 ± 0.5 | 7.5 | 2.5 | 17 | 46 | 95 | 0.7 max | 0.7 max |
| C 57 x 51 | 6.84 | 57.15 + 3.2 - 0.8 | 50.8 ± 1.6 | 5.0 ± 0.5 | 8.5 ± 0.5 | | | | | | 0.7 max | 0.7 max |



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Equal angles

| Size & thickness (mm) | Mass (kg/m) | Tolerance per bundle (kg/m) |
|-----------------------|-------------|-----------------------------|
| 60 X 60 X 6 | 5.42 | ± 0.136 |
| 60 X 60 X 8 | 7.09 | ± 0.177 |
| 60 X 60 X 10 | 8.69 | ± 0.217 |
| 70 X 70 X 6 | 6.38 | ± 0.160 |
| 70 X 70 X 8 | 8.36 | ± 0.209 |
| 70 X 70 X 10 | 10.3 | ± 0.258 |
| 80 X 80 X 6 | 7.34 | ± 0.184 |
| 80 X 80 X 8 | 9.63 | ± 0.241 |
| 80 X 80 X 10 | 11.9 | ± 0.298 |

Unequal angles

| Size & thickness (mm) | Mass (kg/m) | Tolerance per bundle (kg/m) |
|-----------------------|-------------|-----------------------------|
| 65 X 50 X 6 | 5.16 | ± 0.129 |
| 65 X 50 X 8 | 6.75 | ± 0.169 |
| 75 X 50 X 6 | 5.65 | ± 0.141 |
| 75 X 50 X 8 | 7.39 | ± 0.185 |
| 80 X 60 X 6 | 6.37 | ± 0.159 |
| 80 X 60 X 8 | 8.34 | ± 0.209 |
| 90 X 65 X 6 | 7.07 | ± 0.177 |
| 90 X 65 X 8 | 9.29 | ± 0.232 |
| 90 X 65 X 10 | 11.40 | ± 0.285 |
| 100 X 65 X 8 | 9.94 | ± 0.249 |
| 100 X 65 X 10 | 12.30 | ± 0.308 |
| 100 X 75 X 6 | 8.04 | ± 0.201 |
| 100 X 75 X 8 | 10.60 | ± 0.265 |
| 100 X 75 X 10 | 13.00 | ± 0.325 |
| 100 X 75 X 12 | 15.40 | ± 0.385 |

Dimensional tolerances for equal and unequal angles

Flange width

| Size (mm) | Tolerance (mm) |
|--------------|----------------|
| 60 - < = 65 | ± 1.60 |
| 70 - < = 100 | + 3.20 |
| | - 2.40 |

Thickness

| Size (mm) | Tolerance (mm) |
|-----------|----------------|
| < = 12 | ± 0.38 |

Note: Angles may be ordered in either dimensional or mass tolerance but NOT both.

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Hexagons

| Size (mm) | Mass (kg/m) | Tolerance (mm) |
|-----------|-------------|----------------|
| 19.2 | 2.2 | +0.00 –0.40 |
| 22.4 | 3.1 | +0.00 –0.40 |
| 25.6 | 4.0 | +0.00 –0.60 |
| 31.75 | 6.0 | +0.00 –0.90 |

Hollow drill steels (Drilled billet method) – standard sizes and lengths

Alloy or carbon steels according to ISO 722: 1991 and ISO 1722: 1991

| Description | Nominal | | A | Approx Mass kg/m | Hole size (mm) | Ovality (mm) | Max Eccentricity (mm) | Lengths (m) |
|---------------------|---------|-----------------|------|------------------|----------------|--------------|-----------------------|-------------|
| | Size | Tol | | | | | | |
| 19mm Round corner | 19.2 | + 0.0 -0.4 | 21.4 | 2.2 | 5.6 ± 0.70 | ± 1.4 | 1.0 | 8 to 11 |
| 22mm Round corner | 22.4 | + 0.0 -0.4 | 24.8 | 3.1 | 6.7 ± 0.70 | ± 1.4 | 1.0 | 8 to 11 |
| 25mm Round corner | 25.6 | + 0.0 -0.6 | 28.5 | 4.0 | 7.6 ± 0.75 | ± 1.5 | 1.5 | 8 to 11 |
| 32mm Round corner | 31.75 | + 0.0 -0.9 | 35.2 | 6.0 | 10.35 ± 1.0 | ± 2.0 | 1.5 | 6 to 9.0 |
| # 35mm Round corner | 35 | + 0.53 -0.33 | 39.0 | 7.8 | 10.5 ± 1.1 | ± 2.0 | 1.6 | 6 to 9.0 |
| # 38mm Round corner | 38 | + 0.71 -0.0 | 42.6 | 8.3 | 12.4 ± 1.5 | ± 2.0 | 1.6 | 6 to 9.0 |

Non-standard sizes: on enquiry only

DQS Certificates:

- ISO 9001 : 2008, Registration number 314994 QM08, date re- certified 2012-11-12 valid until 2015-11-11
- ISO 14001 : 2004 + Cor 1 2005: Registration number 314994 UM, re – certified 2012-11-12, valid until 2015-11-11
- BS OSHAS 18001 : 2007: Registration number 314994 BSOH, re – certified 2012-11-12 ND valid until 2015-11-11

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