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**Leaf chains**

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## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Chain Association (JCA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 1804**:1993 is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

# Leaf chains

## Introduction

This Japanese Industrial Standard has been prepared based on the fourth edition of **ISO 4347** published in 2004, while modifying some of its technical contents so as to make it complete as a product standard.

The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JF. Annex JA to Annex JC contain matters that are not given in the corresponding International Standard.

## 1 Scope

This Standard specifies the characteristics of leaf chains for lifting or balancing applications.

The sheaves and clevises specified in the corresponding International Standard are described in Annex JD and Annex JE. The AL series leaf chains not specified in the corresponding International Standard are specified in Annex JA, and the sheaves and clevises for them are described in Annex JB and Annex JC.

**NOTE :** The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows:

ISO 4347:2004 *Leaf chains, clevises and sheaves—Dimensions, measuring forces and tensile strengths* (MOD)

The symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7450 *Digital position readout*

JIS B 7502 *Micrometer callipers*

JIS B 7503 *Dial gauges*

JIS B 7507 *Vernier, dial and digital callipers*

JIS B 7721 *Tension/compression testing machines—Verification and calibration of the force-measuring system*

## 3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

### 3.1 leaf chain

an assembly in which inner links and outer links are alternately connected as shown in figure 1 a)

Where required, connecting links are used.

### 3.2 inner link

a link in which the required number of inner plates are clearance-fitted with pins as shown in figure 1 b), according to the nominal number of the chain

### 3.3 outer link

a link in which two pins are pushed into two outer plates so that both ends of the pins are riveted as shown in figure 1 c)

The required number of intermediate plates are clearance-fitted to two pins between the outer plates, according to the nominal number of the chain.

### 3.4 cotter type connecting link

a link in which one end of two connecting pins is pushed into the outer plate and riveted, and the other end is clearance-fitted to the connecting plate and fastened by cotter as shown in figure 1 d)

The required number of immediate plates are clearance-fitted to two connecting pins between the outer plate and the connecting plates, according to the nominal number of the chain.

## 4 Quantity symbols

For the purpose of this Standard, the following quantity symbols apply.

$b_0$  : the thickness of plate (mm)

$b_4$  : the length of pin (mm)

$b_7$  : the additional length of connecting pin (mm)

$d_2$  : the outside diameter of pin (mm)

$d_5$  : the hole diameter of inner plate (mm)

$F_u$  : the minimum tensile strength (kN)

$h_3$  : the height of plate (mm)

$p$  : the standard dimensions of leaf chain pitch (mm)

## 5 Classification

The leaf chains are classified into three types; AL series, BL series and LL series according to the dimensions of each part.

## 6 Nominal number

The nominal number of leaf chains shall be as follows.

- a) The nominal number of BL series leaf chains shall consist of, as shown in example 1 below, the symbol of the chain type, BL, followed by a number of which the first two digits indicate the abbreviation number of the pitch of leaf chain<sup>1)</sup>, and the

last two digits indicate the lacing, i.e. the number of plates in the outer link, and the number of plates in the inner link.

- b) The nominal number of LL series leaf chains shall consist of, as shown in example 2 below, the symbol of the chain type, LL, followed by a number of which the first two digits indicate the abbreviation number of the pitch of leaf chain<sup>1)</sup>, and the last two digits indicate the lacing, i.e. the number of plates in the outer link, and the number of plates in the inner link.
- c) The nominal number of AL series leaf chains shall be in accordance with **JA.2**.

Note <sup>1)</sup> The abbreviation number of the pitch of BL series leaf chains shall be expressed by the pitch of the BL series leaf chain divided by 3.175, using only one or two digits, and that of LL series leaf chains shall be expressed by the pitch of the LL series leaf chain divided by 1.587 5, using only one or two digits.

Example 1    Nominal number    BL    6    3    4

the number of plates in the inner link

the number of plates in the outer link

the abbreviation number expressing the pitch

the symbol expressing the chain type

Example 2    Nominal number    LL    08    2    2

the number of plates in the inner link

the number of plates in the outer link

the abbreviation number expressing the pitch

the symbol expressing the chain type

## 7 Assembly, and structure and designation of components

The structure and designation of each part of a leaf chain shall be as shown in figure 1.

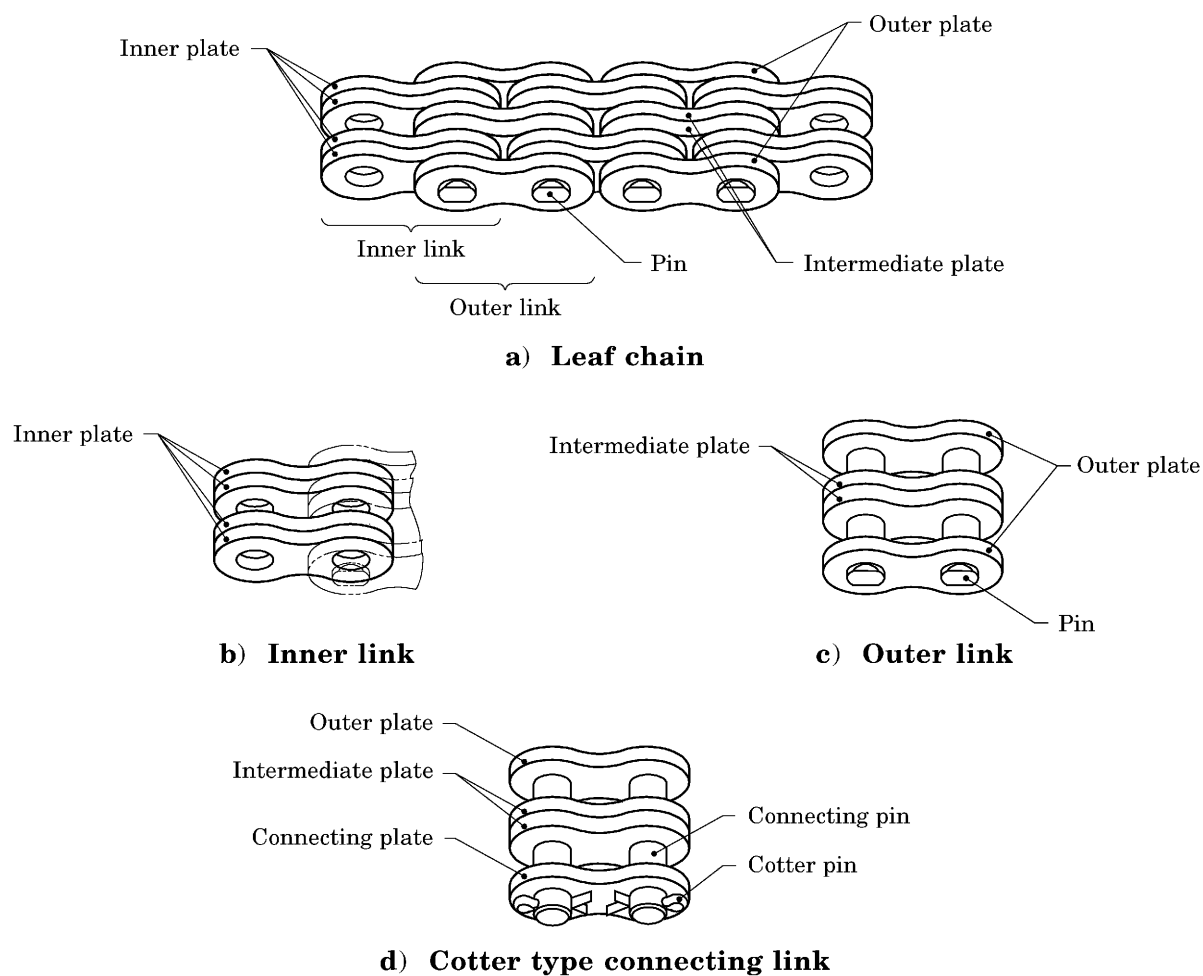


**Figure 1 Structure and designation of each part**

## 8 Shape and dimensions

The shape of leaf chains shall be expressed as shown in table 1 according to the number of plates in the outer link and the number of plates in the inner link. The dimensions of leaf chains, when measured in accordance with 10.1, shall conform to the specification in table 2, table 3 and table JA.1.

**Table 1 Shape of leaf chains**

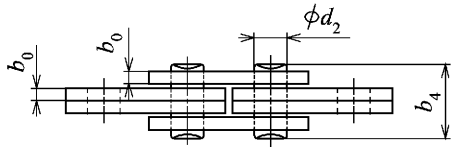
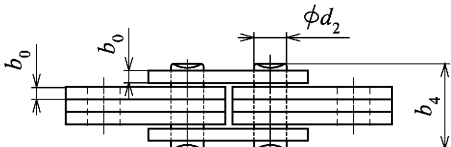
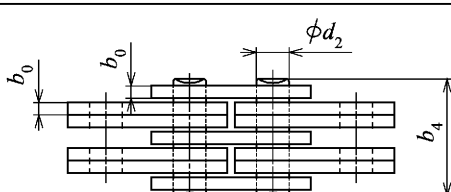
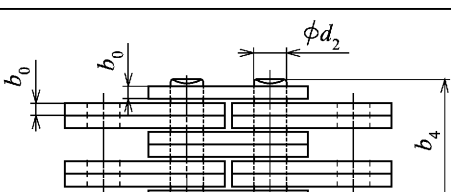
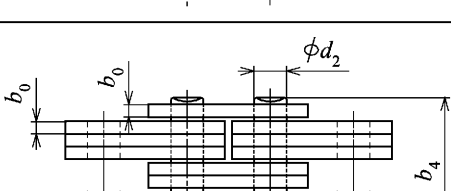
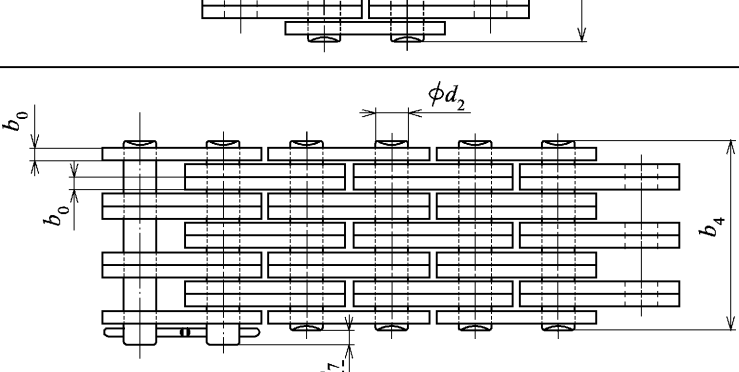
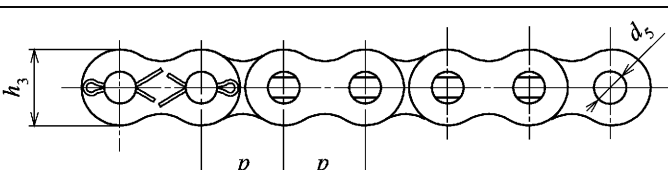
| Number of<br>plates in the<br>outer link | Number of<br>plates in the<br>inner link | Shape of leaf chains                                                                 |
|------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------|
| 2 × 2                                    |                                          |    |
| 2 × 3                                    |                                          |    |
| 3 × 4                                    |                                          |    |
| 4 × 4                                    |                                          |   |
| 4 × 6                                    |                                          |  |
| 6 × 6                                    |                                          |  |
|                                          |                                          |  |

Table 2 Nominal number and dimensions of clevises of BL series leaf chain

| Nominal<br>number | Number of<br>plates in the<br>outer link<br>×<br>number of<br>plates in the<br>inner link | Pitch                   | Plate<br>thickness | Hole<br>diameter of<br>inner plates | Pin outer<br>diameter | Plate height | Pin length | Additional<br>length of<br>connecting<br>pin<br>(max.) | Tension<br>measurement | Minimum<br>tensile<br>strength |
|-------------------|-------------------------------------------------------------------------------------------|-------------------------|--------------------|-------------------------------------|-----------------------|--------------|------------|--------------------------------------------------------|------------------------|--------------------------------|
|                   |                                                                                           | (Standard<br>dimension) | (max.)             | (min.)                              | (max.)                | (max.)       | (max.)     | (max.)                                                 |                        |                                |
|                   |                                                                                           | $p$                     | $b_0$              | $d_5$                               | $d_2$                 | $h_3$        | $b_4$      | $b_7$                                                  |                        | $F_u$                          |
| mm                |                                                                                           |                         |                    |                                     |                       |              |            |                                                        | N                      | kN                             |
| BL422             | 2×2                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 11.1       | 3.9                                                    | 220                    | 22.2                           |
| BL423             | 2×3                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 13.2       | 3.9                                                    | 220                    | 22.2                           |
| BL434             | 3×4                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 17.4       | 3.9                                                    | 330                    | 33.4                           |
| BL444             | 4×4                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 19.6       | 3.9                                                    | 450                    | 44.5                           |
| BL446             | 4×6                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 23.8       | 3.9                                                    | 450                    | 44.5                           |
| BL466             | 6×6                                                                                       | 12.70                   | 2.08               | 5.11                                | 5.09                  | 12.07        | 28.0       | 3.9                                                    | 670                    | 66.7                           |
| BL522             | 2×2                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 12.9       | 4.1                                                    | 330                    | 33.4                           |
| BL523             | 2×3                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 15.4       | 4.1                                                    | 330                    | 33.4                           |
| BL534             | 3×4                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 20.4       | 4.1                                                    | 490                    | 48.9                           |
| BL544             | 4×4                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 22.8       | 4.1                                                    | 670                    | 66.7                           |
| BL546             | 4×6                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 27.7       | 4.1                                                    | 670                    | 66.7                           |
| BL566             | 6×6                                                                                       | 15.875                  | 2.48               | 5.98                                | 5.96                  | 15.09        | 32.7       | 4.1                                                    | 1 000                  | 100.1                          |
| BL622             | 2×2                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 17.4       | 4.6                                                    | 490                    | 48.9                           |
| BL623             | 2×3                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 20.8       | 4.6                                                    | 490                    | 48.9                           |
| BL634             | 3×4                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 27.5       | 4.6                                                    | 760                    | 75.6                           |
| BL644             | 4×4                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 30.8       | 4.6                                                    | 980                    | 97.9                           |
| BL646             | 4×6                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 37.5       | 4.6                                                    | 980                    | 97.9                           |
| BL666             | 6×6                                                                                       | 19.05                   | 3.30               | 7.96                                | 7.94                  | 18.11        | 44.2       | 4.6                                                    | 1 470                  | 146.8                          |
| BL822             | 2×2                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 21.4       | 5.4                                                    | 850                    | 84.5                           |
| BL823             | 2×3                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 25.5       | 5.4                                                    | 850                    | 84.5                           |
| BL834             | 3×4                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 33.8       | 5.4                                                    | 1 290                  | 129.0                          |
| BL844             | 4×4                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 37.9       | 5.4                                                    | 1 690                  | 169.0                          |
| BL846             | 4×6                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 46.2       | 5.4                                                    | 1 690                  | 169.0                          |
| BL866             | 6×6                                                                                       | 25.40                   | 4.09               | 9.56                                | 9.54                  | 24.13        | 54.5       | 5.4                                                    | 2 540                  | 253.6                          |
| BL1022            | 2×2                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 25.4       | 6.1                                                    | 1 160                  | 115.6                          |
| BL1023            | 2×3                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 30.4       | 6.1                                                    | 1 160                  | 115.6                          |
| BL1034            | 3×4                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 40.3       | 6.1                                                    | 1 820                  | 182.4                          |

**Table 2** (concluded)

| Nominal<br>number | Number of<br>plates in the<br>outer link<br>×<br>number of<br>plates in the<br>inner link | Pitch                   | Plate<br>thickness | Hole<br>diameter of<br>inner plates | Pin outer<br>diameter | Plate height | Pin length | Additional<br>length of<br>connecting<br>pin<br>(max.) | Tension<br>measurement | Minimum<br>tensile<br>strength |
|-------------------|-------------------------------------------------------------------------------------------|-------------------------|--------------------|-------------------------------------|-----------------------|--------------|------------|--------------------------------------------------------|------------------------|--------------------------------|
|                   |                                                                                           | (Standard<br>dimension) | (max.)             | (min.)                              | (max.)                | (max.)       | (max.)     | (max.)                                                 |                        |                                |
|                   |                                                                                           | $p$                     | $b_0$              | $d_5$                               | $d_2$                 | $h_3$        | $b_4$      | $b_7$                                                  | $F_u$                  |                                |
| mm                |                                                                                           |                         |                    |                                     |                       |              |            |                                                        | N                      | kN                             |
| BL1044            | 4×4                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 45.2       | 6.1                                                    | 2 310                  | 231.3                          |
| BL1046            | 4×6                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 55.1       | 6.1                                                    | 2 310                  | 231.3                          |
| BL1066            | 6×6                                                                                       | 31.75                   | 4.90               | 11.14                               | 11.11                 | 30.18        | 65.0       | 6.1                                                    | 3 470                  | 347.0                          |
| BL1222            | 2×2                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 29.7       | 6.6                                                    | 1 510                  | 151.2                          |
| BL1223            | 2×3                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 35.5       | 6.6                                                    | 1 510                  | 151.2                          |
| BL1234            | 3×4                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 47.1       | 6.6                                                    | 2 450                  | 244.6                          |
| BL1244            | 4×4                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 52.9       | 6.6                                                    | 3 030                  | 302.5                          |
| BL1246            | 4×6                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 64.6       | 6.6                                                    | 3 030                  | 302.5                          |
| BL1266            | 6×6                                                                                       | 38.10                   | 5.77               | 12.74                               | 12.71                 | 36.20        | 76.2       | 6.6                                                    | 4 540                  | 453.7                          |
| BL1422            | 2×2                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 33.6       | 7.4                                                    | 1 910                  | 191.3                          |
| BL1423            | 2×3                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 40.2       | 7.4                                                    | 1 910                  | 191.3                          |
| BL1434            | 3×4                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 53.4       | 7.4                                                    | 3 160                  | 315.8                          |
| BL1444            | 4×4                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 60.0       | 7.4                                                    | 3 830                  | 382.6                          |
| BL1446            | 4×6                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 73.2       | 7.4                                                    | 3 830                  | 382.6                          |
| BL1466            | 6×6                                                                                       | 44.45                   | 6.60               | 14.31                               | 14.29                 | 42.24        | 86.4       | 7.4                                                    | 5 780                  | 578.3                          |
| BL1622            | 2×2                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 40.0       | 7.9                                                    | 2 890                  | 289.1                          |
| BL1623            | 2×3                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 46.6       | 7.9                                                    | 2 890                  | 289.1                          |
| BL1634            | 3×4                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 61.8       | 7.9                                                    | 4 400                  | 440.4                          |
| BL1644            | 4×4                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 69.3       | 7.9                                                    | 5 780                  | 578.3                          |
| BL1646            | 4×6                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 84.5       | 7.9                                                    | 5 780                  | 578.3                          |
| BL1666            | 6×6                                                                                       | 50.80                   | 7.52               | 17.49                               | 17.46                 | 48.26        | 100.0      | 7.9                                                    | 8 670                  | 867.4                          |
| BL2022            | 2×2                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 51.8       | 10.2                                                   | 4 340                  | 433.7                          |
| BL2023            | 2×3                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 61.7       | 10.2                                                   | 4 340                  | 433.7                          |
| BL2034            | 3×4                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 81.7       | 10.2                                                   | 6 490                  | 649.4                          |
| BL2044            | 4×4                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 91.6       | 10.2                                                   | 8 670                  | 867.4                          |
| BL2046            | 4×6                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 111.5      | 10.2                                                   | 8 670                  | 867.4                          |
| BL2066            | 6×6                                                                                       | 63.50                   | 9.91               | 23.84                               | 23.81                 | 60.33        | 131.4      | 10.2                                                   | 13 000                 | 1 301.1                        |