

# Items to be read before using the product 请在使用之前阅读

Before setting or using Tohatsu springs, please read the Instruction manual and keep it by yourself. ※ Please refer to page 93 for further information on Belleville springs  
请在安装、使用东发弹簧之前，阅读本使用说明书，并在阅读后将其保存在查阅方便之处。※ 蝶簧请参阅 93 页。

## 1. For safe use of the product 产品的安全使用

When using or setting springs, please adhere to the following guidelines.

The indication and meaning of this text are as follows.

在安装、使用弹簧时，务必遵守以下事项。本说明书中的符号表示及其含义如下。

<b>Warning</b>  <b>警告</b>	Failure to adhere to this text could result in the danger of serious accident or human injury during manufacture due to scattering or broken springs. 不遵守该相关事项时，有可能发生因弹簧断裂、飞散而致使操作人员负伤等重大事故。
---	---

<b>Caution</b> <b>注意</b>	Failure to adhere to this text could result in damage to spring and implement of periphery. 不遵守该相关事项时，有可能导致弹簧及周围器具物品的损害。
-----------------------------	---

<b>Reference 参考</b>	Points to understand when using these products 使用产品时，希望理解的事项。
---------------------	---

## 2. Spring handling, usage rules and important points

### 弹簧的保管、使用方法和注意事项

<b>Warning</b>  <b>警告</b>	
<b>◆ Confirmation of product standards</b>	Before the setting or utilization of the springs, please take good note of the specifications at the top of the plan and installation product standards. (Please note in particular that the identification colors and spring characteristics of ISO10243 Standard Products and "JIS B 5012 standard" differ according to product.) Page 77
<b>◆ Deflection used</b>	Please use within the deflection rates noted in our catalogue. Exceeding this rate will result in early breakage due to sudden increase in load or coil contact etc. (figure 1)
<b>◆ Surface scratches</b>	Scratches on the surface of the spring lead to early breakage. If scratches on the spring are found, we recommend that the damaged item be replaced with a new spring.
<b>◆ Corrosive environments</b>	Please avoid using in corrosive environments. There is a chance of rusted springs breaking early, so please replace such items with a new spring. Even products that have been treated with anti-rust machining lubricants may develop rust occur over an extended period of use.
<b>◆ Foreign matter becoming caught in the spring</b>	If a foreign matter becomes caught in the spring's wires during use, it may lead to abnormal loads or collision loads due to entanglement which could cause the spring to break or become damaged. Care must be taken to ensure this does not occur. (figure 2)
<b>◆ Installation requirement (initial pressure)</b>	Please install the spring in a slightly compressed condition (state of initial pressure). Using the product without the initial pressure being applied may lead to breakage at an early stage or other forms of damage during abrasive contact with other items or through abnormal loads. (figure 3)
<b>◆ 产品规格的确认</b>	在安装、使用弹簧之前，请充分确认设计上的弹簧规格和所安装的弹簧规格是否一致。因 ISO10243 标准的产品和强力弹簧在识别颜色、弹簧特性上完全不同，需要特别注意。其不同之处，请参阅第 77 页。
<b>◆ 所使用的压缩量</b>	请在本公司产品说明书中规定的负荷和所对应的压缩量范围内使用弹簧。超过该范围使用时，有可能发生弹簧钢丝接触使负荷急剧上升等而导致弹簧的早期断裂。(参照图 1)
<b>◆ 表面伤痕</b>	弹簧表面有伤痕时，将会使弹簧易于发生早期断裂。在确认弹簧表面存在伤痕的情况时，建议立即更换新弹簧。
<b>◆ 腐蚀环境</b>	请避免在腐蚀环境中使用弹簧。生锈的弹簧可能发生早期断裂，应立即更换新弹簧。即使是具有腐蚀性切削液，如果长期在其中使用，弹簧也有可能生锈。
<b>◆ 挟入异物</b>	使用中的弹簧、如果在弹簧钢丝间存在异物，则会因此产生偏负荷、冲击负荷而使弹簧易于断裂。应给予充分注意。(参照图 2)
<b>◆ 设置条件 (预负荷)</b>	弹簧应在受压缩的状态(有预压的状态)下使用。在没有预压的状态使用时，使用过程中产生的冲击、偏负荷会使弹簧发生早期断裂。(参照图 3)

## Warning 警告

### ◆ Parallel degree of applied pressure

Set the product so that the spring mounting side and the applied pressure side move in a parallel manner over the entire region used. The product may break at an early stage or become damaged due to abnormal loads if it is used with pressure applied in an inclined state. (figure 4)

### ◆ Parallel usage

When using varying and multiple types of springs simultaneously, it is important to take into account the overall balance and the deflection rates used for each spring. (figure 5)

### ◆ Vertical usage prohibited

Please do not use springs in vertically connected groups. This makes the springs easy to buckle and could lead to spring breakage. (figure 6)

### ◆ Double spring usage prohibited

Please do not place a spring of a smaller diameter inside a spring of a larger diameter and use on the same axis. There is a possibility that the wires of one spring may become caught in the other leading to early spring breakage. (figure 7)

### ◆ Spring guide

Usage of the spring without a spring guide makes the spring easy to buckle or bend and may lead to early spring breakage. If used, please align the guide with the inner or outer diameter of the spring. If a metal guide is used on the inside diameter of the spring it may interfere with and wear down the spring leading to early breakage. (figure 8)

### ◆ Temperature range for use

The condition that the spring be used in a normal temperature (40°C or below) is noted in the catalogue's Loads and Standard Values. Usage in ambient temperatures exceeding 80°C may lead to free height reduction and overload or durability reduction. Also, avoid exposure to temperatures of greater than 200°C before use.

### ◆ Storage of springs in a compressed state

Please do not store springs in a compressed state for long periods of time. Storage in a compressed state causes fatigue to the spring. Reused springs may break easily and so the exchange of old springs with new products is recommended.

### ◆ Do not use digonally or horizontally (figure 9)

### ◆ The spring mounting surface must be flat (figure 10)

### ◆ Product use

Please do not use compression springs with a force applied other than in a compressive direction (for example extensive or torsion forces etc.). Please do not apply forces other in an extensive directing to extension springs. Doing so could lead to deformation and breakage. Using the spring for purposes other than which it was intended (hammer, weight, etc.) may lead to unexpected accident or injury.

### ◆ 施压的平行度

在设置弹簧时，应该使弹簧的安装端与施加压力端在使用的全程中保持平行。在倾斜状态下施加压力时，所产生的偏负荷，容易造成早期断裂。（参照图 4）

### ◆ 并排使用

在同一平面上同时使用多类型、复数弹簧时，应该注意所施加压力的平行度、负荷、压缩量等的整体平衡性。（参照图 5）

### ◆ 禁止垂直排列使用

不可将弹簧在纵向重叠使用。纵向重叠使用将使弹簧易于产生弯曲而造成早期断裂。（参照图 6）

### ◆ 禁止内外重叠使用

不可在弹簧内径中插入小径弹簧在同轴上使用。这种使用方式会发生弹簧钢丝相互咬合等而使弹簧易于发生早期断裂。（参照图 7）

### ◆ 弹簧导向

弹簧在无导向的状况下使用时，容易发生弯曲而造成早期断裂。应在内径或外径进行导向。利用金属制的轴类进行内径导向时，弹簧内径与金属导向轴类的相互摩擦会使弹簧内径产生磨损，也是产生早期断裂的原因。（参照图 8）

### ◆ 使用温度

产品说明书中的负荷等标准值是以常温（40°C 以下）下使用为条件。在超过 80°C 的使用环境下，根据使用条件的不同，可能使弹簧的自由高度变低、负荷减弱、寿命降低。此外，即使是在使用之前也应避免在 200°C 以上对弹簧进行加热。

### ◆ 弹簧在压缩状态下的保管

不可使弹簧在持续压缩的状态下进行保管。在压缩状态下保管时，弹簧会发生疲劳。这种弹簧可能已经易于断裂。建议更换用新的弹簧。

### ◆ 禁止横放/斜放使用（参照图 9）

### ◆ 弹簧放置面的要求：请将弹簧设置在平滑的表面（参照图 10）

### ◆ 产品用途

压缩弹簧不可在压缩方向以外施加外力（拉伸、扭转等）进行使用。拉伸弹簧不可在拉伸方向以外进行使用。否则，将有可能使弹簧发生变形、断裂。此外，不可用作弹簧以外的用途（如用作榔头、镇石等）。

Warning  警告

Figure 1

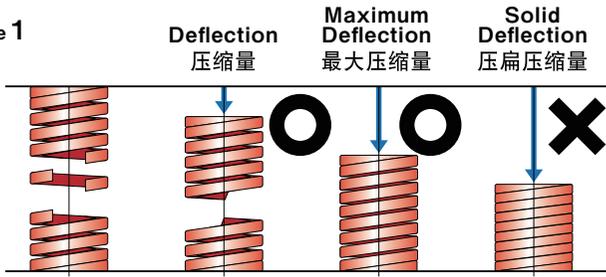


Figure 2

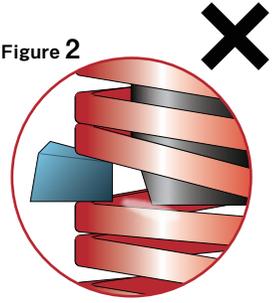


Figure 3

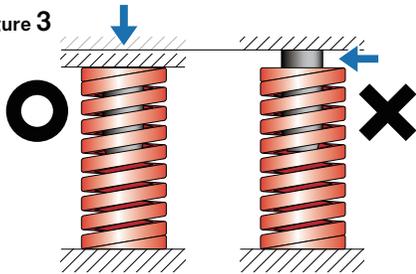


Figure 4

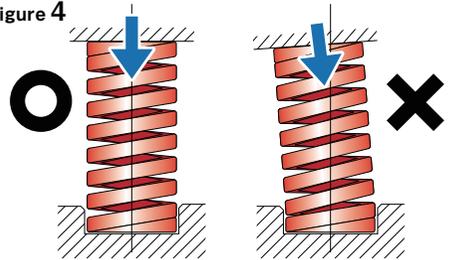


Figure 5

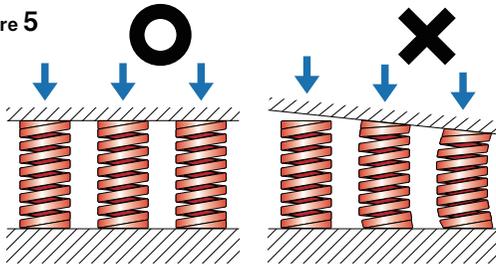


Figure 6

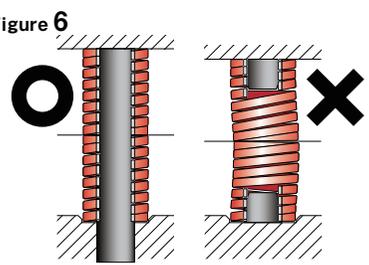


Figure 7

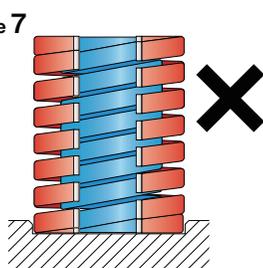


Figure 8

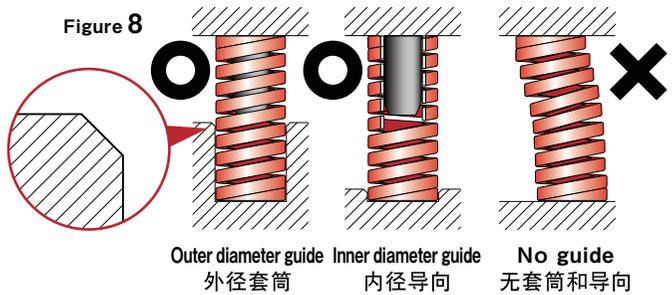


Figure 9

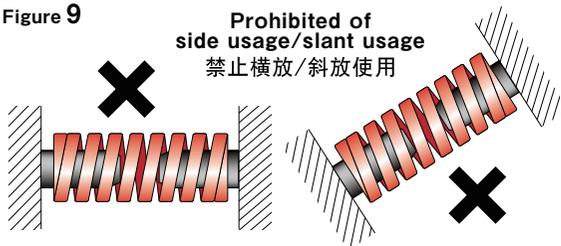
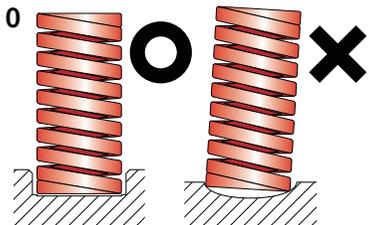


Figure 10



The installed face is made a plane.  
 弹簧放置面的要求：请将弹簧设置在平滑的表面

## Caution 注意

### ◆ Re-enforcement of mounting part

Springs are made from hard steel. This characteristic means that parts applying or receiving pressure from the spring may begin to flake due to abrasion during use. Please take measures to protect and re-enforce parts above and below the spring.

### ◆ Periodic inspection

Weakening of the product will occur in accordance with the frequency of use, please replace the spring when necessary. Please perform inspections to ensure that the product is always treated with an adequate level of anti-rust machining lubricant. Please note that "Uncoated, MR, LR, Other springs (not designated as anti-rust treated)" are not coated by anionic electro-deposition and so are particularly susceptible to rust.

### ◆ Storage

Please store in a safe place that is free from humidity and high temperatures and do not allow other people to handle.

### ◆ Disposal

Tohatsu springs are made from steel alloys (silicon chrome steel used for springs, piano wire, stainless steel wire for springs) and so can be disposed of in the same manner as regular scrap metal. Customers who have special conditions related to the disposal of coated materials should refer to page 103 or contact us for advice.

### ◆ 设置部位的加强

因弹簧是由坚硬的钢制而成，在特性上，向其施加压力部分、承受压力部分有可能被刮削而产生磨损。如果使用上因此会发生问题，希望考虑对设置弹簧部位采取增强、保护的对策。

### ◆ 定期点检

随着使用频度的增加，弹簧会发生永久变形。因此根据需要，有必要对其更换。为防止生锈，需要经常进行检查·维护管理，以使弹簧表面保持涂有适度的防锈油。特别需要注意的是，无涂装弹簧、MR、LR 系列弹簧（无防锈处理指定的）没有进行电泳涂装，容易生锈。

### ◆ 保管

弹簧保管应避免高温潮湿，且无关人员触摸不到的安全场所。

### ◆ 废弃

东发弹簧所用钢丝为低合金钢（弹簧用硅铬钢、琴钢丝、弹簧用不锈钢丝），可作为通常的金属废弃物处理。对涂料的废弃条件有要求的用户，请与第 103 页上所记载的本公司垂询窗口联系。

## 3. About product standards 产品规格

### Reference 参考

### ◆ Outside and Inside, diameters

Spring dimensions are measured from the 1st or 2nd coil from the spring's end section (see figure 1).

### ◆ Spring constants

Guidelines for load calculations for deflection rates

### ◆ Load characteristics

There may be instances wherein the actual load values fall outside the allowable load variance with the load at a low level and at a high level as the load nears the maximum deflection rate (sticking) in relation to load calculation values with strong spring fixed numbers (refer to graph 1).

### ◆ Identification colors

Even when the identification colors are the same standard loads and standard dimensions may vary. Please take good care when selecting springs.

### ◆ 外径、内径

外径和内径是指弹簧端部 1 ~ 2 圈的尺寸。（参照图 1）

### ◆ 弹簧常数

负荷与变形量比值的参考数值。

### ◆ 负荷特性

与由弹簧常数计算出的负荷计算值相比，实际负荷的情况是，开始变形时的负荷偏低，而接近最大变形量（压扁）时，负荷偏高，甚至实测的负荷值有可能超出负荷的许用范围。（参照图表 1）

### ◆ 识别颜色

不同标准的弹簧，识别颜色不同，其标准负荷、尺寸规格也不同。在识别上要充分注意。

### Tohatsu springs 强力弹簧

Load Type 负荷级别	Light loads 轻负荷	Extremely heavy loads 极重负荷
Model 型号	TL	TB
Color 识别颜色	Bleu 蓝色	Brown 棕色

### Tohatsu α springs 强力弹簧 α (阿尔法)

Model 型号	TLR	TD	TE
Color 识别颜色	Bleu 蓝色	Brown 棕色	Brown 棕色

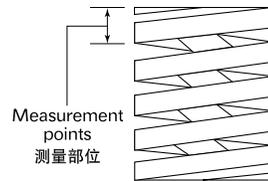


Figure 5  
图 1

