



# Cremalleras y Engranajes

Precisión y Estándar

**DEVOTEC**



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**GRUPO GAES** ofrecemos soluciones técnicas especializadas en sistemas mecánicos industriales, garantizando eficiencia y calidad en cada aplicación.

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En **Sistemas Mecánicos GAES**, desarrollamos 5 líneas principales de negocio vinculadas a la mecánica industrial. Desde nuestros orígenes trabajamos con las mejores marcas del sector, siendo canal oficial de distribución en España.

Disponemos de instalaciones en toda la Península, lo que nos permite agilizar los procesos (solución de problemas, abastecimiento de material, asistencia técnica, etc) que requieran nuestros clientes.

Además, sumamos capacidades al disponer de nuestra oficina técnica, talleres propios de mecanizado y montaje, servicio 24h y mantenimiento predictivo; lo que nos permite aportar soluciones óptimas y personalizadas a nuestros clientes.

**DEVOTEC** son especialistas en cremalleras de precisión para transmisión industrial, ofreciendo fiabilidad y alto rendimiento en sistemas automatizados.

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**Devotec Automation**, con presencia consolidada desde 2012, se dedican a la ingeniería, fabricación y venta de cremalleras, piñones, engranajes y otros elementos de transmisión lineal de precisión para sistemas automatizados. Su experiencia abarca desde el desarrollo de componentes DIN 5/DIN 6 de alta precisión hasta soluciones personalizadas de guías y transmisiones para diversas industrias.

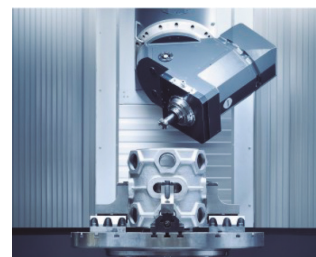
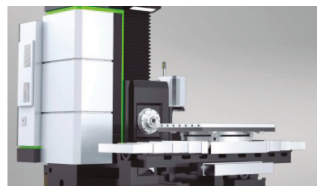
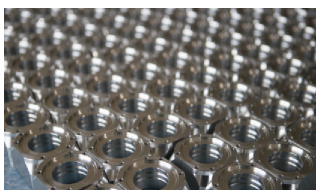
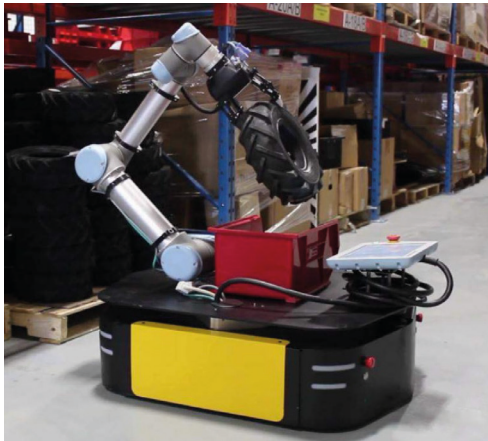
La compañía utiliza equipos importados de Alemania para asegurar un control de calidad estable y capacidades técnicas avanzadas, y forma parte del holding de Joudier Precision Industry (Kunshan) Co. Ltd. desde 2020, lo que le ha permitido ampliar su capacidad productiva y su oferta de servicios especializados.

Además, Devotec presta atención a las necesidades del mercado global con una amplia gama de productos de transmisión de alta precisión, contribuyendo a la eficiencia y fiabilidad de aplicaciones industriales automatizadas, desde cintas transportadoras y AGVs hasta mecanismos de posicionamiento de alta exigencia.



## Sectores de aplicación

- > Procesamiento láser
- > Logística inteligente
- > Solución robótica
- > Maquinaria de impresión
- > Automatización industrial
- > Equipo médico
- > Equipo semiconductor
- > Transporte inteligente
- > Industria energética
- > Maquinaria textil
- > Maquinaria de alimentos
- > Equipo de entretenimiento
- > Equipo de pruebas
- > Industria papelera
- > Industria del automóvil
- > Energías renovables
- > Industria naval
- > Obra pública
- > Industria del reciclaje
- > Máquina Herramienta
- > Envase y embalaje
- > Industria alimentaria
- > Elevación
- > Siderurgia
- > Hormigones y áridos
- > Industria maderera
- > Equipo óptico
- > Equipo de alta precisión



## Información general

> Grupo GAES trabajamos con una de las especificaciones estándar más importantes del mundo, la **certificación DIN**.

### Tabla comparativa de grados de calidad

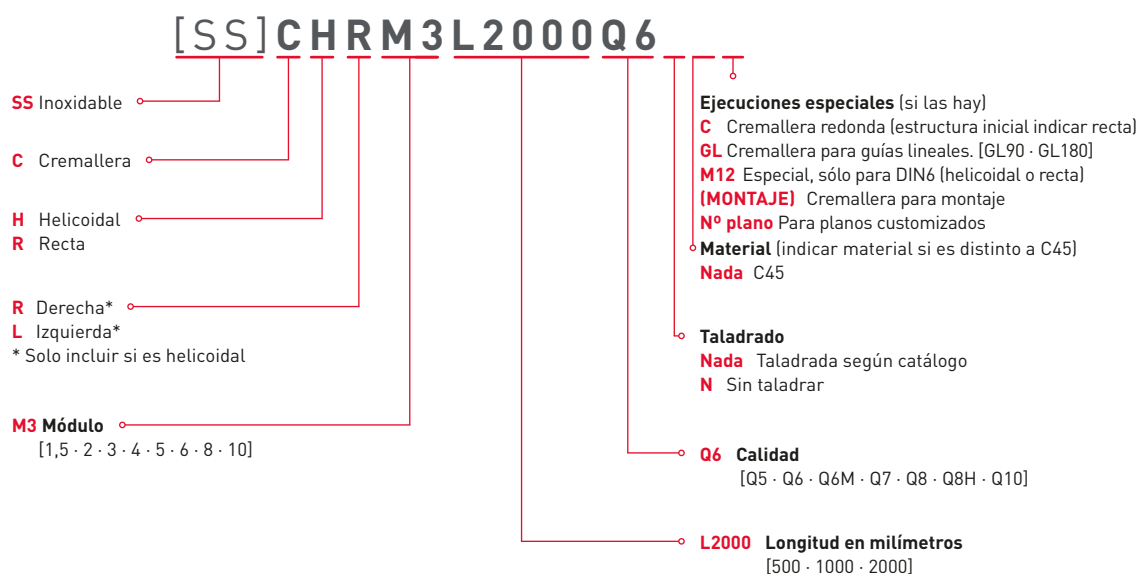
| Estándar                                                    | Grado de calidad |    |    |    |    |    |    |    |    |     |    |    |
|-------------------------------------------------------------|------------------|----|----|----|----|----|----|----|----|-----|----|----|
| <b>AGMA</b> (American Gear Manufacturers Association)       |                  | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7   | 6  | 5  |
| <b>DIN</b> (Deutsches Institut für Normung)                 |                  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  | 11 | 12 |
| <b>GB</b>                                                   |                  |    | 3  | 4  | 5  | 6  | 7  | 8  | 9  |     |    |    |
| <b>ISO</b> (International Organization for Standardization) | 1                | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  | 11 | 12 |
| <b>JIS</b> (Japanese Industrial Standards)                  |                  |    |    | 0  | 1  | 2  | 3  | 4  | 5  | 6   | 7  | 8  |
| <b>JIS N</b>                                                |                  |    |    | N4 | N5 | N6 | N7 | N8 | N9 | N10 |    |    |

### Tabla comparativa de aplicaciones

| Calidad         | Módulo   | Aplicación                                                                                                                                                                                                    |
|-----------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Q5</b>       | 1.5 ~ 10 | Máquinas-herramienta de alta precisión<br>Eje de elevación                                                                                                                                                    |
| <b>Q6 - Q6M</b> | 1.5 ~ 10 | Centro de mecanizado tipo pórtico<br>Máquina-herramienta<br>Cortadora por chorro de agua / láser / bomba eléctrica<br>Maquinaria para trabajar la madera<br>Acoplamiento de guía lineal<br>Curvadora de tubos |
| <b>Q8</b>       | 1.5 ~ 10 | Máquina de soldadura<br>Manipulador<br>Sistema automático de manipulación / carga y descarga<br>Eje lineal de baja carga                                                                                      |
| <b>Q10</b>      | 1.5 ~ 10 | Eje de elevación<br>Sistema automático de manipulación / carga y descarga<br>Manipulador<br>Uso en exteriores<br>Robot, séptimo eje                                                                           |

| Tipo de dentado   | Calidad | Material   | Dureza                                                                                        | Tratamiento dentado |
|-------------------|---------|------------|-----------------------------------------------------------------------------------------------|---------------------|
| <b>Helicoidal</b> | Q5      | C45/42CrMo | <b>C45:</b> Templado por inducción HRC50-55<br><b>42CrMo:</b> Templado por inducción HRC50-55 | Rectificado         |
|                   | Q6      | C45/42CrMo |                                                                                               |                     |
|                   | Q6M     | C45/42CrMo |                                                                                               |                     |
| <b>Derecha</b>    | Q8      | C45        | Sin tratamiento                                                                               | Fresado             |
|                   | Q8      | C45/42CrMo | Templado y revenido HRC20-25                                                                  | Fresado             |
|                   | Q10     | C45        | Templado por inducción HRC50-55                                                               | Fresado             |
| <b>19°31'42"</b>  | Q5      | C45/42CrMo | <b>C45:</b> Templado por inducción HRC50-55<br><b>42CrMo:</b> Templado por inducción HRC50-55 | Rectificado         |
|                   | Q6      | C45/42CrMo |                                                                                               |                     |
|                   | Q6M     | C45/42CrMo |                                                                                               |                     |
|                   | Q8      | C45        | Sin tratamiento                                                                               | Fresado             |
|                   | Q8      | C45/42CrMo | Templado y revenido HRC20-25                                                                  | Fresado             |
| <b>Recto</b>      | Q10     | C45        | Templado por inducción HRC50-55                                                               | Fresado             |

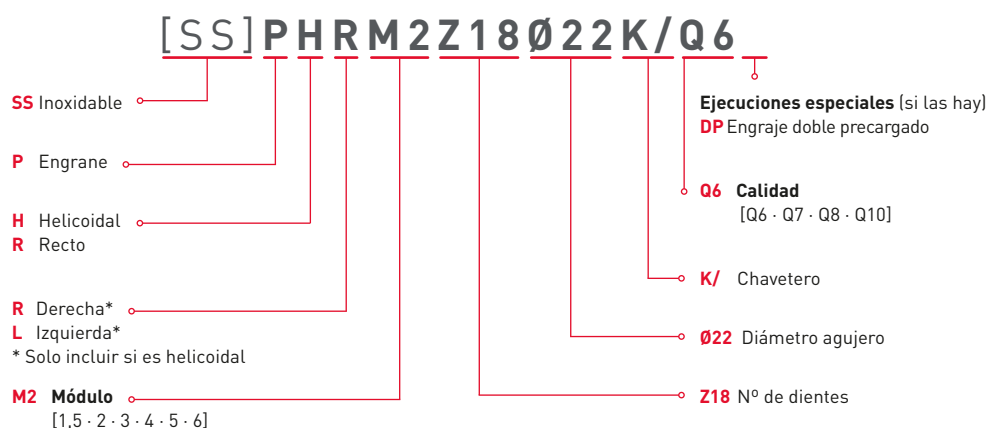
## Desglose referencia cremalleras



## &gt; Ejemplos

- SSCRM3L2000** Cremallera inoxidable recta, de módulo 3, longitud 2000 mm.  
**CHRM4L500Q8N** Cremallera helicoidal a derecha, de módulo 4, longitud 500 mm, calidad Q8, sin taladrar.  
**CRM1.5L1000Q6M12** Cremallera recta, de módulo 1.5, longitud 1000 mm, calidad Q6, taladrada, con cota especial.

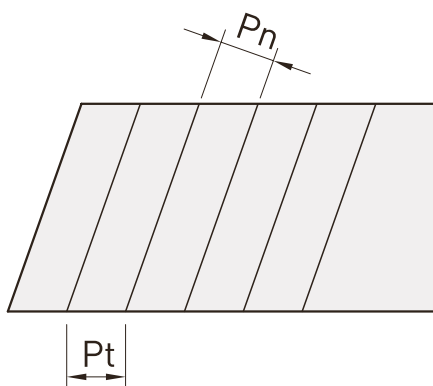
## Desglose referencia engranajes



## &gt; Ejemplos

- PHLM2Z18Ø22K/Q6** Engrane helicoidal a izquierda, de módulo 2, dentado Z18, diámetro 22 con chavetero, calidad Q6.

## Tabla de conversión entre paso de engranaje y módulo



**Pn** Paso normal

**Pt** Paso transversal (para dentado helicoidal)

Al personalizar la longitud de la cremallera, se recomienda elegir un número entero de dientes.

| Tabla de conversión entre paso de engranaje y módulo |         |         |
|------------------------------------------------------|---------|---------|
| Módulo                                               | Pn      | Pt      |
| 1.5                                                  | 4,7124  | 5,0000  |
| 2                                                    | 6,2832  | 6,6667  |
| 3                                                    | 9,4248  | 10,0000 |
| 4                                                    | 12,5664 | 13,3334 |
| 5                                                    | 15,7080 | 16,6667 |
| 6                                                    | 18,8496 | 20,0000 |
| 8                                                    | 25,1327 | 26,6667 |
| 10                                                   | 31,4159 | 33,3334 |

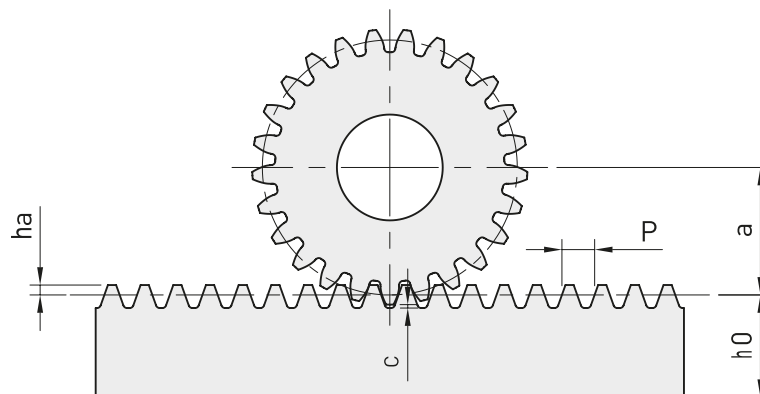
## Tabla de tolerancias de precisión por grado

| Calidad | Módulo | Rectitud por cada 1000 (mm) | Error de paso individual fpe (μm) | Error acumulado de paso en 1000 mm Fp (μm) |
|---------|--------|-----------------------------|-----------------------------------|--------------------------------------------|
| Q5      | 1,5    | 0,02                        | 6                                 | 25                                         |
|         | 2      | 0,02                        | 6                                 | 25                                         |
|         | 3      | 0,02                        | 6                                 | 25                                         |
|         | 4      | 0,02                        | 7                                 | 28                                         |
|         | 5      | 0,02                        | 7                                 | 28                                         |
|         | 6      | 0,02                        | 7                                 | 28                                         |
|         | 8      | 0,02                        | 8                                 | 31                                         |
| Q6      | 10     | 0,02                        | 8                                 | 31                                         |
|         | 1,5    | 0,03                        | 8                                 | 32                                         |
|         | 2      | 0,03                        | 8                                 | 32                                         |
|         | 3      | 0,03                        | 8                                 | 36                                         |
|         | 4      | 0,03                        | 10                                | 40                                         |
|         | 5      | 0,03                        | 10                                | 40                                         |
|         | 6      | 0,03                        | 10                                | 40                                         |
| Q6M     | 8      | 0,03                        | 11                                | 40                                         |
|         | 10     | 0,03                        | 11                                | 40                                         |
|         | 1,5    | 0,04                        | 14                                | 52                                         |
|         | 2      | 0,04                        | 14                                | 52                                         |
|         | 3      | 0,04                        | 12                                | 48                                         |
|         | 4      | 0,04                        | 12                                | 48                                         |
|         | 5      | 0,04                        | 12                                | 48                                         |
| Q8      | 6      | 0,04                        | 12                                | 48                                         |
|         | 8      | 0,04                        | 12                                | 48                                         |
|         | 10     | 0,04                        | 12                                | 48                                         |
|         | 1,5    | 0,06                        | 16                                | 63                                         |
|         | 2      | 0,06                        | 16                                | 63                                         |
|         | 3      | 0,06                        | 16                                | 71                                         |
|         | 4      | 0,06                        | 20                                | 80                                         |
| Q10     | 5      | 0,06                        | 20                                | 80                                         |
|         | 6      | 0,06                        | 20                                | 80                                         |
|         | 8      | 0,06                        | 22                                | 80                                         |
|         | 10     | 0,06                        | 22                                | 80                                         |
|         | 1,5    | 0,08                        | 36                                | 140                                        |
|         | 2      | 0,08                        | 36                                | 140                                        |
|         | 3      | 0,08                        | 36                                | 160                                        |
| Q10     | 4      | 0,08                        | 45                                | 180                                        |
|         | 5      | 0,08                        | 45                                | 180                                        |
|         | 6      | 0,08                        | 45                                | 180                                        |
|         | 8      | 0,08                        | 50                                | 180                                        |
|         | 10     | 0,08                        | 50                                | 180                                        |
|         | 1,5    | 0,08                        | 50                                | 180                                        |
|         | 2      | 0,08                        | 50                                | 180                                        |

La rectitud se mide cuando la cremallera está fijada sobre una superficie plana.



## Información sobre engranajes

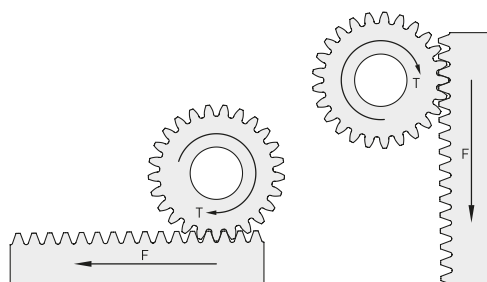


| Módulo | Ángulo de presión   | Nº de dientes | Ángulo helicoidal                             |
|--------|---------------------|---------------|-----------------------------------------------|
| m      | $\alpha = 20^\circ$ | Z             | $\beta = 19^\circ 31' 42'' / \beta = 0^\circ$ |

| Adendo   | Juego de fondo | Paso circular | Distancia entre centros                  |
|----------|----------------|---------------|------------------------------------------|
| $ha = m$ | $C = 0.25 m$   | $P = \pi m$   | $a = mZ / 2 \cos \beta + mx \text{ (1)}$ |

(1): x – Coeficiente de desplazamiento del perfil

## Cálculo y selección



| Factor de sobrecarga 1                                                                                                                                 | Factor de vida útil               |      | Factor de seguridad |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|---------------------|
| fl                                                                                                                                                     | Régimen de servicio               | fc   | fs                  |
| fl = 1<br>fl = 1.55                                                                                                                                    | <8h/24h                           | 1    | 1.1-2               |
|                                                                                                                                                        | 8-12h/24h                         | 1,2  | 1.1-2               |
|                                                                                                                                                        | >12h/24h                          | 1,35 | 1.1-2               |
| Parámetro de aplicación                                                                                                                                | Carga en movimiento (kg)          |      | m                   |
|                                                                                                                                                        | Velocidad de aceleración (m/s2)   |      | a=u/60÷t            |
|                                                                                                                                                        | Coeficiente de fricción (–)       |      | μ=0.1               |
|                                                                                                                                                        | Aceleración de la gravedad (m/s2) |      | g=9.8               |
|                                                                                                                                                        | Velocidad de movimiento (m/min)   |      | u                   |
|                                                                                                                                                        | Tiempo de aceleración (sec)       |      | t                   |
|                                                                                                                                                        | Diámetro de paso (mm)             |      | d0                  |
| Cálculo                                                                                                                                                | Fórmula                           |      |                     |
|                                                                                                                                                        | Movimiento horizontal             |      | Movimiento vertical |
| Fuerza de accionamiento                                                                                                                                | Fu = m × g × μ + m × a            |      | Fu = m × g + m × a  |
| Par (torque)                                                                                                                                           | Tu = Fu × d0 ÷ 2000               |      |                     |
| Velocidad                                                                                                                                              | n = u × 1000 ÷ π ÷ d0             |      |                     |
| Condición                                                                                                                                              | FuTab ≥ Fu × fl × fc × fs         |      |                     |
| Fuerza máxima de accionamiento (según este parámetro, seleccione la cremallera y el engranaje adecuados en la tabla de fuerza máxima de accionamiento) |                                   |      |                     |

Tabla ISO 17-1

[ = 20°]

## Ejemplo de cálculo

| Factor de sobrecarga 1            | Factor de vida útil                                                                                                                        |  | Factor de seguridad                     |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------|
| Parámetro de aplicación           | Carga en movimiento (kg)                                                                                                                   |  | 300                                     |
|                                   | Velocidad de aceleración (m/s <sup>2</sup> )                                                                                               |  | 4                                       |
|                                   | Coeficiente de fricción (-)                                                                                                                |  | 0.1                                     |
|                                   | Aceleración de la gravedad (m/s <sup>2</sup> )                                                                                             |  | 9.81                                    |
|                                   | Velocidad de movimiento (m/min)                                                                                                            |  | 64.8                                    |
|                                   | Tiempo de aceleración (sec)                                                                                                                |  | 0.27                                    |
|                                   | Diámetro de paso (mm)                                                                                                                      |  | 40                                      |
| Cálculo                           | Fórmula                                                                                                                                    |  |                                         |
|                                   | Movimiento horizontal                                                                                                                      |  | Movimiento vertical                     |
| Fuerza de accionamiento (N)       | $300 \times 9.81 \times 0.1 + 300 \times 4 = 1494.3$                                                                                       |  | $300 \times 9.81 + 300 \times 4 = 4143$ |
| Par (torque) (Nm)                 | $1494.3 \times 40/2000 = 29.89$                                                                                                            |  | $4143 \times 40/2000 = 82.86$           |
| Velocidad (rpm)                   | $64.8 \times 1000/3.14/40 = 515.92$                                                                                                        |  |                                         |
| Coeficiente de selección          | $f_l = 1$<br>$f_c = 1.2$<br>$f_s = 1.5$                                                                                                    |  |                                         |
| Fuerza de accionamiento calculada | Movimiento horizontal $F_{uTab} \geq 1494.3 \times 1 \times 1.2 \times 1.5 = 2689.74$ N                                                    |  |                                         |
|                                   | Movimiento vertical $F_{uTab} \geq 4143.0 \times 1 \times 1.2 \times 1.5 = 7457.40$ N                                                      |  |                                         |
| Cremallera opcional               | Movimiento horizontal: puede seleccionarse cremallera helicoidal m1,5 calidad DIN 6; cremallera helicoidal m2,0 calidad DIN 8, templada... |  |                                         |
|                                   | Movimiento vertical: puede seleccionarse cremallera helicoidal m2,0 calidad DIN 6; cremallera helicoidal m3,0 calidad DIN 8, templada...   |  |                                         |

## Tabla de fuerza máxima de accionamiento · Dentado helicoidal

| Engranaje |    |           | Cremallera                     |         |                 |                       |                          |
|-----------|----|-----------|--------------------------------|---------|-----------------|-----------------------|--------------------------|
|           |    | DIN6      | DIN5                           | DIN6/6M | DIN8            |                       | DIN10                    |
|           |    | 20CrMnTi  | 42CrMo                         | C45     | C45             | C45                   | C45                      |
|           |    | Cementado | Endurecido por inducción       |         | Sin tratamiento | Templado y endurecido | Endurecido por inducción |
| Módulo    | Z  | dw        | Fuerza máxima de accionamiento |         |                 |                       |                          |
| 1,5       | 20 | 31,831    | 6820                           | 5150    | 605             | 995                   | 1640                     |
| 1,5       | 21 | 33,423    | 6950                           | 5350    | 650             | 1050                  | 1680                     |
| 2         | 20 | 42,441    | 11750                          | 8925    | 920             | 1665                  | 3010                     |
| 2         | 22 | 46,686    | 12290                          | 9350    | 1400            | 2100                  | 3260                     |
| 2         | 25 | 53,052    | 12810                          | 9750    | 1800            | 2450                  | 3320                     |
| 2         | 28 | 59,418    | 13070                          | 9800    | 2000            | 2650                  | 3430                     |
| 2         | 30 | 63,661    | 13400                          | 9860    | 2165            | 2950                  | 3650                     |
| 2         | 32 | 67,906    | 13590                          | 9910    | 2220            | 3200                  | 3740                     |
| 3         | 20 | 63,662    | 18500                          | 16450   | 2320            | 3430                  | 8120                     |
| 3         | 22 | 70,028    | 18820                          | 16520   | 2690            | 4320                  | 8300                     |
| 3         | 25 | 79,579    | 19310                          | 16550   | 3740            | 5750                  | 8500                     |
| 3         | 32 | 101,859   | 19900                          | 16670   | 4550            | 6950                  | 8650                     |
| 4         | 20 | 84,883    | 39880                          | 30090   | 4790            | 8398                  | 14390                    |
| 4         | 21 | 89,127    | 39920                          | 30150   | 5580            | 9300                  | 14400                    |
| 4         | 24 | 101,859   | 40010                          | 30200   | 8390            | 12190                 | 14700                    |
| 4         | 25 | 106,103   | 40200                          | 30200   | 9390            | 12500                 | 14810                    |
| 5         | 18 | 95,493    | 59500                          | 48310   | 11500           | 15500                 | 28490                    |
| 5         | 21 | 111,408   | 61450                          | 50300   | 11950           | 19020                 | 31250                    |
| 5         | 24 | 127,324   | 64550                          | 52350   | 13650           | 24300                 | 35000                    |
| 6         | 20 | 127,324   | 82000                          | 69000   | 21700           | 29250                 | 47270                    |
| 6         | 25 | 159,155   | 85500                          | 72050   | 33500           | 45200                 | 49490                    |
| 8         | 20 | 169,766   | 150500                         | 126450  | 46000           | 62100                 | 93350                    |
| 10        | 20 | 212,207   | 220000                         | 193420  | 85600           | 115500                | 143350                   |

Los datos de la tabla se basan en la norma DIN 3990 y se obtienen mediante las siguientes fórmulas:

(1) resistencia al contacto

$$\sigma_H = \sqrt{\frac{W_{Ht}}{d_1} \times \frac{u+1}{u}} \times Z_H \times Z_M \times Z_\epsilon \leq \sigma_{HP}$$

(2) resistencia a la flexión

$$\sigma_F = \frac{W_{Ft}}{m_n} \times Y_F \times Y_B \times Y_\epsilon \leq \sigma_{FP}$$

Se presentan como referencia. Las condiciones de contorno son: con buena lubricación, velocidad de funcionamiento de 1,5 m/s, factor de seguridad del pie del diente de 1,4 y factor de seguridad de la superficie del diente de 1, la vida útil alcanza las 20.000 horas.

## Tabla de fuerza máxima de accionamiento · Dentado recto

| Engranaje |    |           | Cremallera                     |         |                 |                       |                          |
|-----------|----|-----------|--------------------------------|---------|-----------------|-----------------------|--------------------------|
|           |    | DIN6      | DIN5                           | DIN6/6M | DIN8            |                       | DIN10                    |
|           |    | 20CrMnTi  | 42CrMo                         | C45     | C45             | C45                   | C45                      |
|           |    | Cementado | Endurecido por inducción       |         | Sin tratamiento | Templado y endurecido | Endurecido por inducción |
| Módulo    | Z  | dw        | Fuerza máxima de accionamiento |         |                 |                       |                          |
| 1,5       | 20 | 30        | 4700                           | 4100    | 510             | 760                   | 1230                     |
| 1,5       | 21 | 31,5      | 4800                           | 4200    | 540             | 790                   | 1310                     |
| 2         | 20 | 40        | 7920                           | 6980    | 750             | 950                   | 2100                     |
| 2         | 22 | 44        | 8180                           | 7045    | 1050            | 1000                  | 2170                     |
| 2         | 25 | 50        | 8440                           | 7200    | 1120            | 1270                  | 2750                     |
| 2         | 28 | 56        | 8560                           | 7340    | 1350            | 1320                  | 3300                     |
| 2         | 30 | 60        | 8670                           | 7380    | 1550            | 1510                  | 3850                     |
| 2         | 32 | 64        | 8750                           | 7420    | 1650            | 1650                  | 4400                     |
| 3         | 20 | 60        | 13500                          | 11800   | 1800            | 1850                  | 5120                     |
| 3         | 22 | 66        | 15150                          | 11900   | 1920            | 2230                  | 6580                     |
| 3         | 25 | 75        | 15600                          | 12050   | 2350            | 3110                  | 6700                     |
| 3         | 28 | 84        | 16100                          | 12150   | 3470            | 4630                  | 7400                     |
| 4         | 20 | 80        | 26100                          | 23650   | 3570            | 5450                  | 11210                    |
| 4         | 22 | 88        | 26300                          | 23700   | 3720            | 5650                  | 11280                    |
| 4         | 25 | 100       | 26900                          | 23750   | 5170            | 7630                  | 11570                    |
| 4         | 28 | 112       | 27300                          | 23850   | 5250            | 7810                  | 11750                    |
| 5         | 18 | 90        | 42000                          | 38700   | 10500           | 13200                 | 22100                    |
| 5         | 21 | 105       | 43060                          | 38750   | 11950           | 15820                 | 22180                    |
| 5         | 25 | 125       | 44600                          | 39950   | 14020           | 18930                 | 22250                    |
| 6         | 21 | 126       | 64200                          | 52850   | 17910           | 22500                 | 40500                    |
| 6         | 25 | 150       | 66530                          | 54750   | 20100           | 25250                 | 41100                    |
| 8         | 20 | 160       | 110250                         | 101800  | 27750           | 34900                 | 81150                    |
| 10        | 20 | 200       | 169200                         | 161800  | 55750           | 70100                 | 145000                   |

Los datos de la tabla se basan en la norma DIN 3990 y se obtienen mediante las siguientes fórmulas:

(1) resistencia al contacto

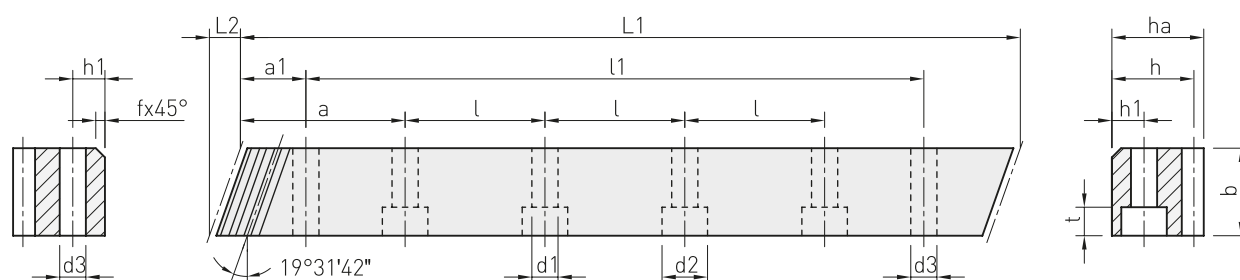
$$\sigma_H = \sqrt{\frac{W_{Ht}}{d_1} \times \frac{u+1}{u}} \times Z_H \times Z_M \times Z_\epsilon \leq \sigma_{HP}$$

(2) resistencia a la flexión

$$\sigma_F = \frac{W_{Ft}}{m_n} \times Y_F \times Y_B \times Y_\epsilon \leq \sigma_{FP}$$

Se presentan como referencia. Las condiciones de contorno son: con buena lubricación, velocidad de funcionamiento de 1,5 m/s, factor de seguridad del pie del diente de 1,4 y factor de seguridad de la superficie del diente de 1, la vida útil alcanza las 20.000 horas.

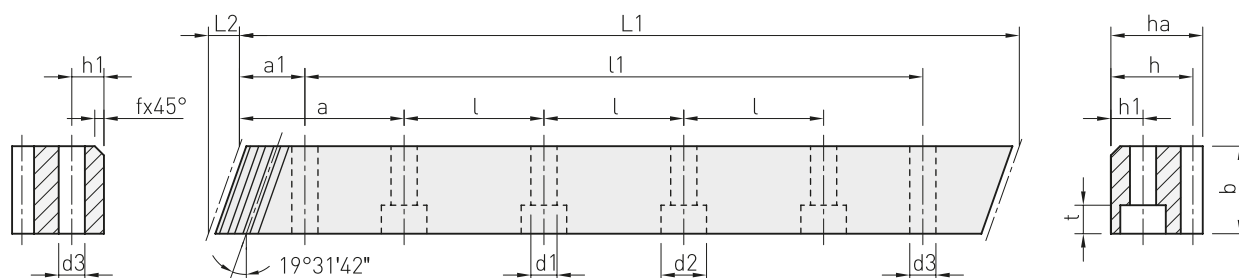
## 1.1.1 Cremallera helicoidal · Q5



|                       |             |                       |                        |
|-----------------------|-------------|-----------------------|------------------------|
| » Calidad             | DIN5h22     | » Ángulo de hélice    | 19°31'42"              |
| » Tratamiento dentado | Rectificado | » Material            | 42CrMo                 |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°         |                       | HRC55-60               |

| Referencia           | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|----------------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q542CrMo  | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q542CrMo | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q542CrMo | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q542CrMo    | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q542CrMo   | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q542CrMo   | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q542CrMo    | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q542CrMo   | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q542CrMo   | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q542CrMo    | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q542CrMo   | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L2000Q542CrMo   | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM5L500Q542CrMo    | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q542CrMo   | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q542CrMo   | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q542CrMo    | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q542CrMo   | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q542CrMo   | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q542CrMo    | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q542CrMo   | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q542CrMo   | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q542CrMo   | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q542CrMo  | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |

## 1.1.2 Cremallera helicoidal · Q6

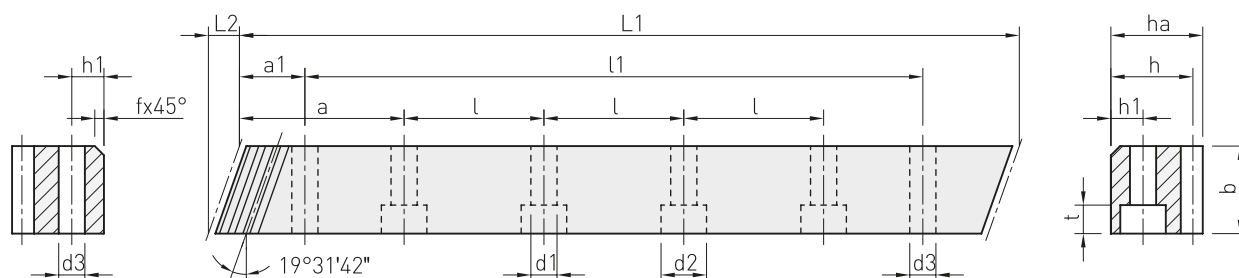


|                       |             |                       |                        |
|-----------------------|-------------|-----------------------|------------------------|
| » Calidad             | DIN6h25     | » Ángulo de hélice    | 19°31'42"              |
| » Tratamiento dentado | Rectificado | » Material            | C45                    |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°         |                       | HRC50-55               |

| Referencia      | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|-----------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q6   | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q6  | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q6  | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q6     | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q6    | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q6    | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q6     | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q6    | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q6    | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q6     | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q6    | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L1000Q6M12 | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 13 | 14 | 20 | 11.7 | 8  | 75  | 10.7 |
| CHRM4L2000Q6    | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM4L2000Q6M12 | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 13 | 14 | 20 | 11.7 | 16 | 150 | 21.4 |
| CHRM5L500Q6     | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q6    | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q6    | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q6     | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q6    | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q6    | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q6     | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q6    | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q6    | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q6    | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q6   | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |



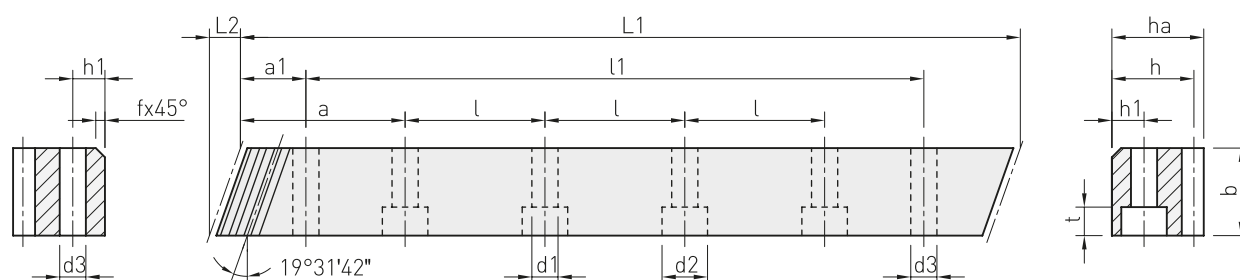
### 1.1.3 Cremallera helicoidal · Q6M



- » **Calidad** DIN6e25
- » **Tratamiento dentado** Rectificado
- » **Norma engranaje** DIN867
- » **Ángulo de presión** 20°
- » **Ángulo de hélice** 19°31'42"
- » **Material** C45
- » **Tratamiento térmico** Templado por inducción
- HRC50-55

| Referencia      | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|-----------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q6M  | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q6M | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q6M | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q6M    | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q6M   | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q6M   | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q6M    | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q6M   | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q6M   | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q6M    | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q6M   | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L2000Q6M   | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM5L500Q6M    | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q6M   | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q6M   | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q6M    | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q6M   | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q6M   | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q6M    | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q6M   | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q6M   | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q6M   | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q6M  | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |

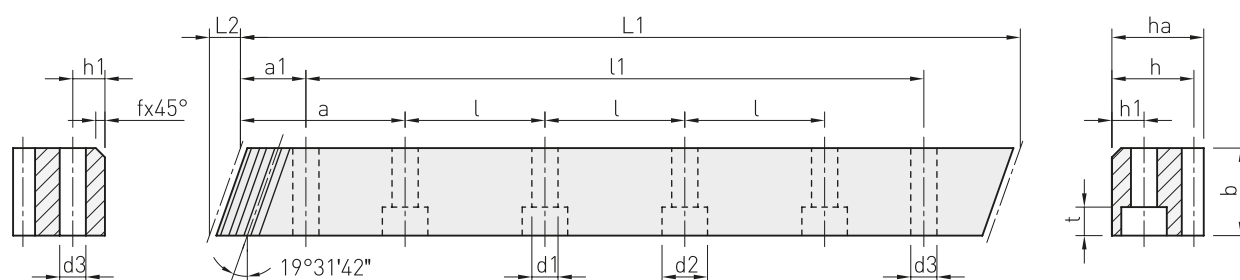
## 1.1.4 Cremallera helicoidal · Q8



|                       |         |                       |                 |
|-----------------------|---------|-----------------------|-----------------|
| » Calidad             | DIN8e27 | » Ángulo de hélice    | 19°31'42"       |
| » Tratamiento dentado | Fresado | » Material            | C45             |
| » Norma engranaje     | DIN867  | » Tratamiento térmico | Sin tratamiento |
| » Ángulo de presión   | 20°     |                       |                 |

| Referencia     | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | Nº | Z   | kg   |
|----------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q8  | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q8 | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q8 | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q8    | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q8   | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q8   | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q8    | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q8   | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q8   | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q8    | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q8   | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L2000Q8   | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM5L500Q8    | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q8   | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q8   | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q8    | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q8   | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q8   | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q8    | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q8   | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q8   | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q8   | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q8  | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |

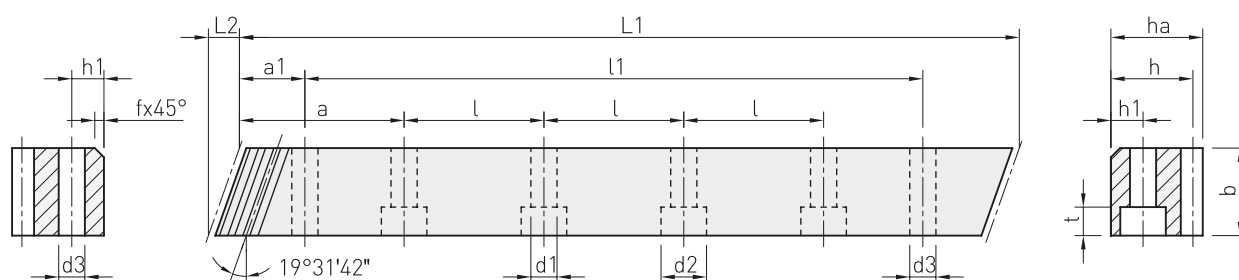
## 1.1.5 Cremallera helicoidal · Q8H



- » Calidad: DIN8e27
- » Tratamiento dentado: Fresado
- » Norma engranaje: DIN867
- » Ángulo de presión: 20°
- » Ángulo de hélice: 19°31'42"
- » Material: C45
- » Tratamiento térmico: Templado y revenido

| Referencia      | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|-----------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q8H  | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q8H | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q8H | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q8H    | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q8H   | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q8H   | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q8H    | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q8H   | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q8H   | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q8H    | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q8H   | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L2000Q8H   | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM5L500Q8H    | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q8H   | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q8H   | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q8H    | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q8H   | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q8H   | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q8H    | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q8H   | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q8H   | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q8H   | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q8H  | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |

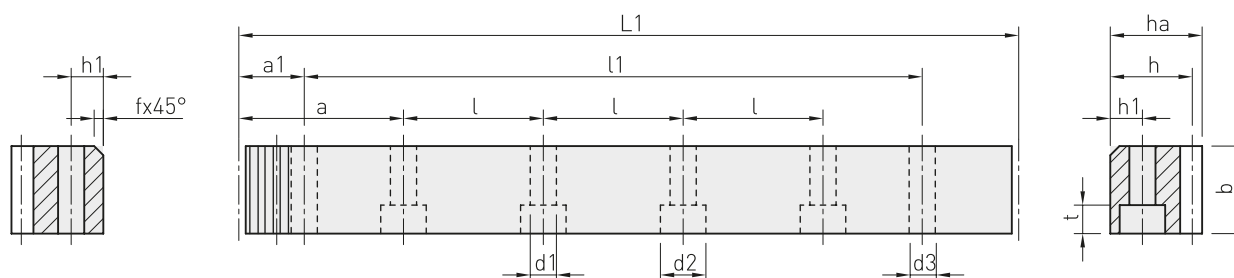
## 1.1.6 Cremallera helicoidal · Q10



|                       |          |                       |                        |
|-----------------------|----------|-----------------------|------------------------|
| » Calidad             | DIN10e27 | » Ángulo de hélice    | 19°31'42"              |
| » Tratamiento dentado | Fresado  | » Material            | C45                    |
| » Norma engranaje     | DIN867   | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°      |                       | HRC50-55               |

| Referencia      | Módulo | L1     | L2   | l   | l1     | a    | a1   | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|-----------------|--------|--------|------|-----|--------|------|------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CHRM1.5L500Q10  | 1.5    | 500    | 7.1  | 125 | 436.6  | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 4  | 100 | 1.3  |
| CHRM1.5L1000Q10 | 1.5    | 1000   | 7.1  | 125 | 936.6  | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 8  | 200 | 2.6  |
| CHRM1.5L2000Q10 | 1.5    | 2000   | 7.1  | 125 | 1936.6 | 62.5 | 31.7 | 17 | 18.5 | 8  | 1 | 17 | 7  | 7  | 11 | 5.7  | 16 | 400 | 5.2  |
| CHRM2L500Q10    | 2      | 500    | 8.5  | 125 | 436.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 75  | 2.1  |
| CHRM2L1000Q10   | 2      | 1000   | 8.5  | 125 | 936.6  | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 150 | 4.1  |
| CHRM2L2000Q10   | 2      | 2000   | 8.5  | 125 | 1936.6 | 62.5 | 31.7 | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 300 | 8.2  |
| CHRM3L500Q10    | 3      | 500    | 10.3 | 125 | 430    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 50  | 2.9  |
| CHRM3L1000Q10   | 3      | 1000   | 10.3 | 125 | 930    | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 100 | 5.9  |
| CHRM3L2000Q10   | 3      | 2000   | 10.3 | 125 | 1930   | 62.5 | 35   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 200 | 11.8 |
| CHRM4L500Q10    | 4      | 506.66 | 13.8 | 125 | 433    | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 38  | 5.4  |
| CHRM4L1000Q10   | 4      | 1000   | 13.8 | 125 | 933.4  | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 75  | 10.7 |
| CHRM4L2000Q10   | 4      | 2000   | 13.8 | 125 | 1933.4 | 62.5 | 33.3 | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 150 | 21.4 |
| CHRM5L500Q10    | 5      | 500    | 17.4 | 125 | 425    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 30  | 6.5  |
| CHRM5L1000Q10   | 5      | 1000   | 17.4 | 125 | 925    | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 60  | 13   |
| CHRM5L2000Q10   | 5      | 2000   | 17.4 | 125 | 1925   | 62.5 | 37.5 | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 120 | 26   |
| CHRM6L500Q10    | 6      | 500    | 20.9 | 125 | 425    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 25  | 9.9  |
| CHRM6L1000Q10   | 6      | 1000   | 20.9 | 125 | 925    | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 50  | 19.8 |
| CHRM6L2000Q10   | 6      | 2000   | 20.9 | 125 | 1925   | 62.5 | 37.5 | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 100 | 39.6 |
| CHRM8L500Q10    | 8      | 480    | 28   | 120 | 240    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 18  | 21   |
| CHRM8L1000Q10   | 8      | 960    | 28   | 120 | 720    | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 36  | 42.5 |
| CHRM8L2000Q10   | 8      | 1920   | 28   | 120 | 1680   | 60   | 120  | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 72  | 85   |
| CHRM10L500Q10   | 10     | 500    | 35.1 | 125 | 250    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 15  | 34.8 |
| CHRM10L1000Q10  | 10     | 1000   | 35.1 | 125 | 750    | 62.5 | 125  | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 30  | 69.6 |

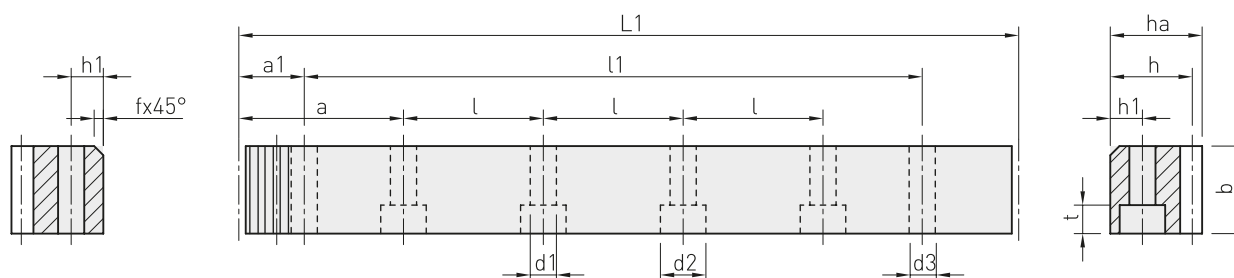
## 1.2.1 Cremallera recta · Q5



|                       |             |                       |                        |
|-----------------------|-------------|-----------------------|------------------------|
| » Calidad             | DIN5h22     | » Ángulo de hélice    | 0°                     |
| » Tratamiento dentado | Rectificado | » Material            | 42CrMo                 |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°         |                       | HRC55-60               |

| Referencia          | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|---------------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q542CrMo  | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q542CrMo | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q542CrMo | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q542CrMo    | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q542CrMo   | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q542CrMo   | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q542CrMo    | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q542CrMo   | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q542CrMo   | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q542CrMo    | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q542CrMo   | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q542CrMo   | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q542CrMo    | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q542CrMo   | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q542CrMo   | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q542CrMo    | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q542CrMo   | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q542CrMo   | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q542CrMo    | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q542CrMo   | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q542CrMo   | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q542CrMo   | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q542CrMo  | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |

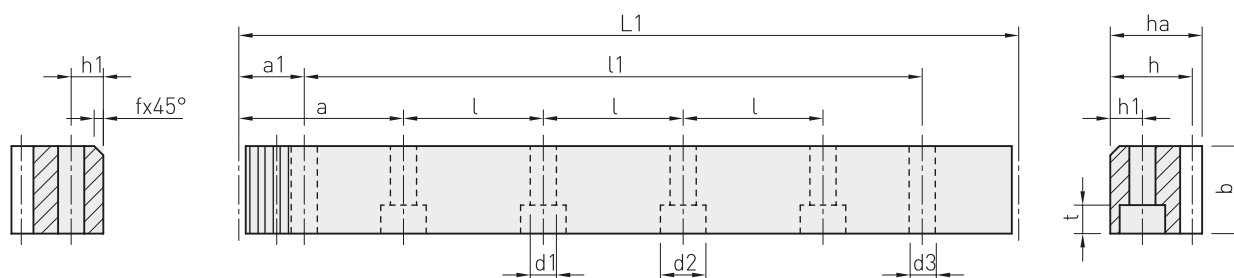
## 1.2.2 Cremallera recta · Q6



|                       |             |                       |                        |
|-----------------------|-------------|-----------------------|------------------------|
| » Calidad             | DIN6h25     | » Ángulo de hélice    | 0°                     |
| » Tratamiento dentado | Rectificado | » Material            | C45                    |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°         |                       | HRC50-55               |

| Referencia     | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|----------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q6   | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q6  | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q6  | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q6     | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q6    | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q6    | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q6     | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q6    | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q6    | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q6     | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q6    | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L1000Q6M12 | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 13 | 14 | 20 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q6    | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM4L2000Q6M12 | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 13 | 14 | 20 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q6     | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q6    | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q6    | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q6     | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q6    | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q6    | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q6     | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q6    | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q6    | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q6    | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q6   | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |

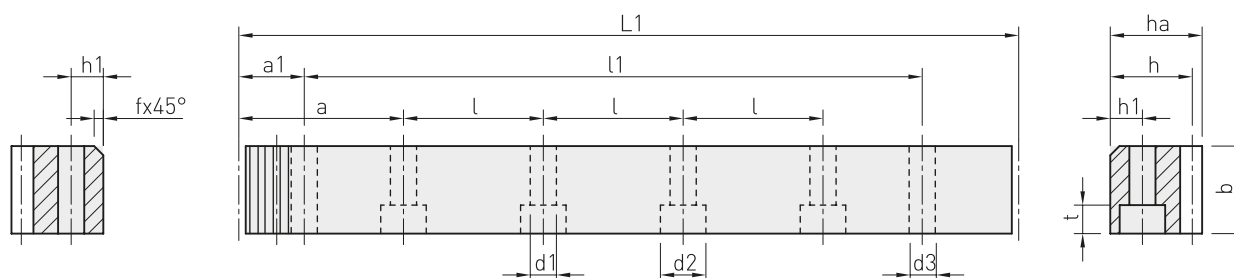
## 1.2.3 Cremallera recta · Q6M



|                       |             |                       |                        |
|-----------------------|-------------|-----------------------|------------------------|
| » Calidad             | DIN6e25     | » Ángulo de hélice    | 0°                     |
| » Tratamiento dentado | Rectificado | » Material            | C45                    |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°         |                       | HRC50-55               |

| Referencia     | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|----------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q6M  | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q6M | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q6M | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q6M    | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q6M   | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q6M   | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q6M    | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q6M   | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q6M   | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q6M    | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q6M   | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q6M   | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q6M    | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q6M   | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q6M   | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q6M    | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q6M   | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q6M   | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q6M    | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q6M   | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q6M   | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q6M   | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q6M  | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |

## 1.2.4 Cremallera recta · Q8

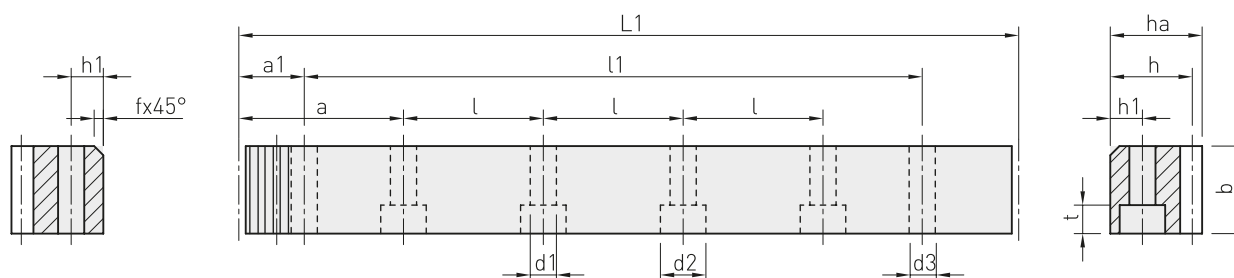


|                       |         |                       |                 |
|-----------------------|---------|-----------------------|-----------------|
| » Calidad             | DIN8e27 | » Ángulo de hélice    | 0°              |
| » Tratamiento dentado | Fresado | » Material            | C45             |
| » Norma engranaje     | DIN867  | » Tratamiento térmico | Sin tratamiento |
| » Ángulo de presión   | 20°     |                       |                 |

| Referencia    | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|---------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q8  | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q8 | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q8 | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q8    | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q8   | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q8   | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q8    | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q8   | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q8   | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q8    | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q8   | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q8   | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q8    | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q8   | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q8   | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q8    | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q8   | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q8   | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q8    | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q8   | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q8   | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q8   | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q8  | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |



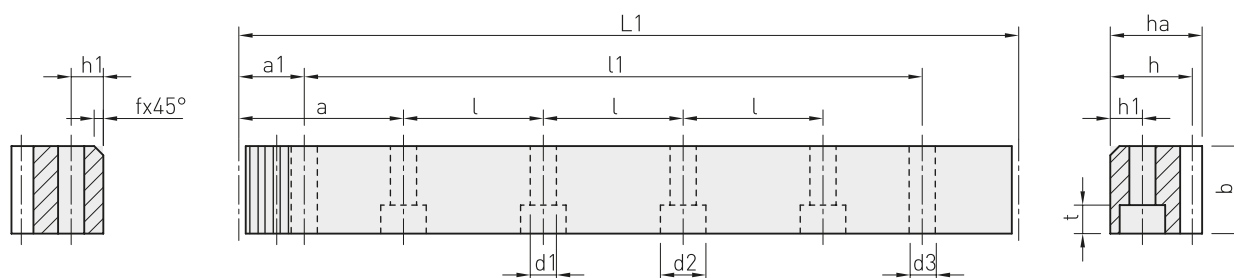
## 1.2.5 Cremallera recta · Q8H



|                       |         |                       |                     |
|-----------------------|---------|-----------------------|---------------------|
| » Calidad             | DIN8e27 | » Ángulo de hélice    | 0°                  |
| » Tratamiento dentado | Fresado | » Material            | C45                 |
| » Norma engranaje     | DIN867  | » Tratamiento térmico | Templado y revenido |
| » Ángulo de presión   | 20°     |                       |                     |

| Referencia     | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|----------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q8H  | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q8H | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q8H | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q8H    | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q8H   | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q8H   | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q8H    | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q8H   | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q8H   | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q8H    | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q8H   | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q8H   | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q8H    | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q8H   | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q8H   | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q8H    | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q8H   | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q8H   | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q8H    | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q8H   | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q8H   | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q8H   | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q8H  | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |

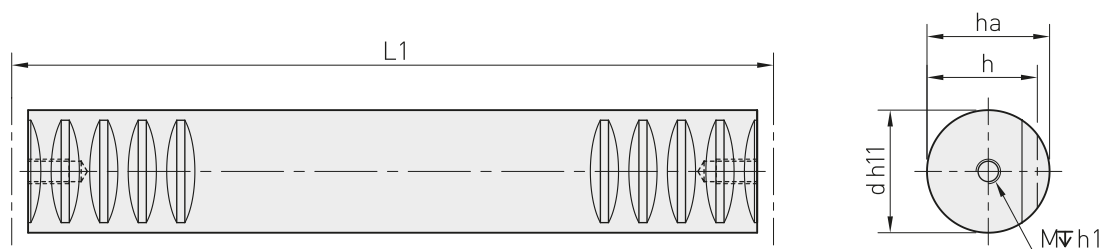
## 1.2.6 Cremallera recta · Q10



|                       |          |                       |                        |
|-----------------------|----------|-----------------------|------------------------|
| » Calidad             | DIN10e27 | » Ángulo de hélice    | 0°                     |
| » Tratamiento dentado | Fresado  | » Material            | C45                    |
| » Norma engranaje     | DIN867   | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°      |                       | HRC50-55               |

| Referencia     | Módulo | L1      | l      | l1      | a     | a1     | ha | h    | h1 | f | b  | t  | d1 | d2 | d3   | N° | Z   | kg   |
|----------------|--------|---------|--------|---------|-------|--------|----|------|----|---|----|----|----|----|------|----|-----|------|
| CRM1.5L500Q10  | 1.5    | 499.51  | 124.88 | 441     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 4  | 106 | 1.3  |
| CRM1.5L1000Q10 | 1.5    | 999.03  | 124.88 | 941     | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 8  | 212 | 2.6  |
| CRM1.5L2000Q10 | 1.5    | 1998.05 | 124.88 | 1940    | 62.44 | 29     | 20 | 18.5 | 8  | 1 | 20 | 7  | 7  | 11 | 5.7  | 16 | 424 | 5.2  |
| CRM2L500Q10    | 2      | 502.65  | 125.66 | 440.1   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 4  | 80  | 2.1  |
| CRM2L1000Q10   | 2      | 1005.3  | 125.66 | 942.7   | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 8  | 160 | 4.1  |
| CRM2L2000Q10   | 2      | 2010.6  | 125.66 | 1948    | 62.8  | 31.3   | 24 | 22   | 8  | 2 | 24 | 7  | 7  | 11 | 5.7  | 16 | 320 | 8.2  |
| CRM3L500Q10    | 3      | 508.93  | 127.23 | 440.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 4  | 54  | 2.9  |
| CRM3L1000Q10   | 3      | 1017.87 | 127.23 | 949.1   | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 8  | 108 | 5.9  |
| CRM3L2000Q10   | 3      | 2035.75 | 127.23 | 1966.97 | 63.6  | 34.4   | 29 | 26   | 9  | 2 | 29 | 9  | 10 | 15 | 7.7  | 16 | 216 | 11.8 |
| CRM4L500Q10    | 4      | 502.65  | 125.66 | 427.7   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 4  | 40  | 5.4  |
| CRM4L1000Q10   | 4      | 1005.3  | 125.66 | 930.3   | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 8  | 80  | 10.7 |
| CRM4L2000Q10   | 4      | 2010.62 | 125.66 | 1935.61 | 62.8  | 37.5   | 39 | 35   | 12 | 3 | 39 | 9  | 10 | 15 | 7.7  | 16 | 160 | 21.4 |
| CRM5L500Q10    | 5      | 502.65  | 125.66 | 442.4   | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 4  | 32  | 6.5  |
| CRM5L1000Q10   | 5      | 1005.3  | 125.66 | 945     | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 8  | 64  | 13   |
| CRM5L2000Q10   | 5      | 2010.62 | 125.66 | 1950.3  | 62.8  | 30.1   | 39 | 34   | 12 | 3 | 49 | 13 | 14 | 20 | 11.7 | 16 | 128 | 26   |
| CRM6L500Q10    | 6      | 508.93  | 127.23 | 446.1   | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 4  | 27  | 9.9  |
| CRM6L1000Q10   | 6      | 1017.87 | 127.23 | 955     | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 8  | 54  | 19.8 |
| CRM6L2000Q10   | 6      | 2035.75 | 127.23 | 1972.88 | 63.6  | 31.4   | 49 | 43   | 16 | 3 | 59 | 17 | 18 | 26 | 15.7 | 16 | 108 | 39.6 |
| CRM8L500Q10    | 8      | 502.65  | 125.66 | 449.5   | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 4  | 20  | 21   |
| CRM8L1000Q10   | 8      | 1005.3  | 125.66 | 952     | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 8  | 40  | 42.5 |
| CRM8L2000Q10   | 8      | 2010.62 | 125.66 | 1957.31 | 62.8  | 26.6   | 79 | 71   | 25 | 3 | 79 | 21 | 22 | 33 | 19.7 | 16 | 80  | 85   |
| CRM10L500Q10   | 10     | 501.23  | 125.66 | 251.3   | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 4  | 16  | 34.8 |
| CRM10L1000Q10  | 10     | 1005.3  | 125.66 | 754     | 62.08 | 124.98 | 99 | 89   | 32 | 3 | 99 | 32 | 33 | 48 | 19.7 | 8  | 32  | 69.6 |

## 1.3 Cremallera redonda · Q10

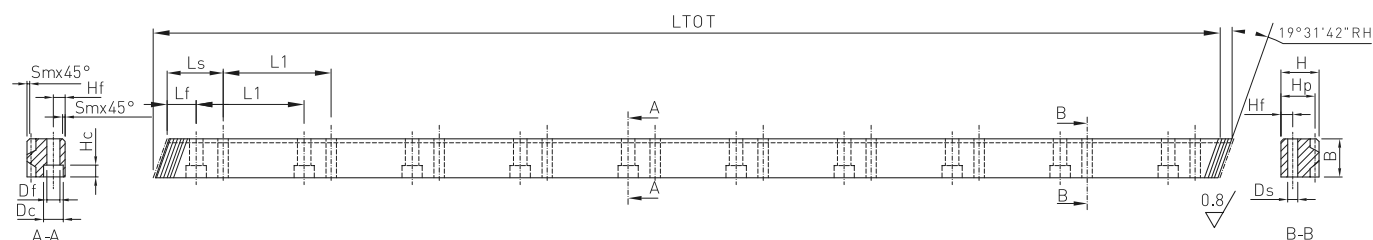


|                       |          |                       |                        |
|-----------------------|----------|-----------------------|------------------------|
| » Calidad             | DIN10e27 | » Ángulo de hélice    | 0°                     |
| » Tratamiento dentado | Fresado  | » Material            | C45                    |
| » Norma engranaje     | DIN867   | » Tratamiento térmico | Templado por inducción |
| » Ángulo de presión   | 20°      |                       | HRC50-55               |

| Referencia      | Módulo | L1   | d  | ha    | h     | h1 | M   | kg    |
|-----------------|--------|------|----|-------|-------|----|-----|-------|
| CRM1.5L500Q10C  | 1.5    | 500  | 15 | 14.8  | 13.3  | 10 | M5  | 0.61  |
| CRM1.5L1000Q10C | 1.5    | 1000 | 15 | 14.8  | 13.3  | 10 | M5  | 1.22  |
| CRM1.5L2000Q10C | 1.5    | 2000 | 15 | 14.8  | 13.3  | 10 | M5  | 2.44  |
| CRM2L500Q10C    | 2      | 500  | 20 | 19.75 | 17.75 | 12 | M6  | 1.1   |
| CRM2L1000Q10C   | 2      | 1000 | 20 | 19.75 | 17.75 | 12 | M6  | 2.2   |
| CRM2L2000Q10C   | 2      | 2000 | 20 | 19.75 | 17.75 | 12 | M6  | 4.4   |
| CRM3L500Q10C    | 3      | 500  | 30 | 29.75 | 26.75 | 20 | M10 | 2.44  |
| CRM3L1000Q10C   | 3      | 1000 | 30 | 29.75 | 26.75 | 20 | M10 | 4.8   |
| CRM3L2000Q10C   | 3      | 2000 | 30 | 29.75 | 26.75 | 20 | M10 | 9.6   |
| CRM4L500Q10C    | 4      | 500  | 40 | 39.7  | 35.7  | 24 | M12 | 4.32  |
| CRM4L1000Q10C   | 4      | 1000 | 40 | 39.7  | 35.7  | 24 | M12 | 8.64  |
| CRM4L2000Q10C   | 4      | 2000 | 40 | 39.7  | 35.7  | 24 | M12 | 17.28 |
| CRM5L500Q10C    | 5      | 500  | 50 | 49.7  | 44.7  | 32 | M16 | 6.75  |
| CRM5L1000Q10C   | 5      | 1000 | 50 | 49.7  | 44.7  | 32 | M16 | 13.5  |
| CRM5L2000Q10C   | 5      | 2000 | 50 | 49.7  | 44.7  | 32 | M16 | 27    |
| CRM6L500Q10C    | 6      | 500  | 60 | 59.7  | 53.7  | 32 | M16 | 9.7   |
| CRM6L1000Q10C   | 6      | 1000 | 60 | 59.7  | 53.7  | 32 | M16 | 19.45 |
| CRM6L2000Q10C   | 6      | 2000 | 60 | 59.7  | 53.7  | 32 | M16 | 38.9  |
| CRM8L500Q10C    | 8      | 500  | 80 | 79.7  | 71.7  | 40 | M24 | 17.3  |
| CRM8L1000Q10C   | 8      | 1000 | 80 | 79.7  | 71.7  | 40 | M24 | 34.5  |
| CRM8L2000Q10C   | 8      | 2000 | 80 | 79.7  | 71.7  | 40 | M24 | 69    |

| Referencia DEVOTEC | Módulo | L1   | Paso | d  | ha   | h     | h1 | M   | kg   |
|--------------------|--------|------|------|----|------|-------|----|-----|------|
| CRM1.6L500Q10C     | 1.591  | 500  | 5    | 15 | 14.8 | 13.21 | 10 | M5  | 0.78 |
| CRM1.6L1000Q10C    | 1.591  | 1000 | 5    | 15 | 14.8 | 13.21 | 10 | M5  | 1.55 |
| CRM3.1L500Q10C     | 3.183  | 500  | 10   | 30 | 29.7 | 26.52 | 20 | M10 | 3.1  |
| CRM3.1L1000Q10C    | 3.183  | 1000 | 10   | 30 | 29.7 | 26.52 | 20 | M10 | 6.2  |

## 1.4 Cremallera para guías lineales · 90° · Q6 · Q8

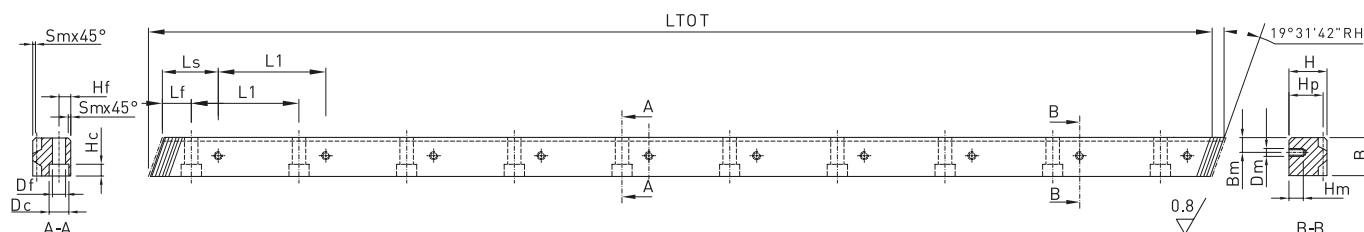


|                        |                       |                       |                        |
|------------------------|-----------------------|-----------------------|------------------------|
| » Calidad              | Q6                    | » Ángulo de hélice    | 19° 31' 42" (derecha)  |
| » Tratamiento dentado  | Rectificado           | » Material            | SAE1141                |
| » Resistencia a rotura | 800 N/mm <sup>2</sup> | » Tratamiento térmico | Templado por inducción |
| » Taladrado            | 90°                   |                       | HRC 56~60°             |

| Referencia              | Módulo | L TOT | L3     | Z   | B  | H     | Hp    | Sm | Lf | L1 | Nº perf. | Hf   | Df  | Dc  | Hc  | Ls | Ds  |
|-------------------------|--------|-------|--------|-----|----|-------|-------|----|----|----|----------|------|-----|-----|-----|----|-----|
| CHRM2L1000Q6GL90(20x20) | 2      | 960   | 6.739  | 144 | 19 | 19.5  | 17.5  | 1  | 10 | 60 | 16       | 7.5  | 4.5 | 7.5 | 5.3 | 30 | 4.5 |
| CHRM2L500Q6GL90(20x20)  | 2      | 480   | 6.739  | 72  | 19 | 19.5  | 17.5  | 1  | 10 | 60 | 8        | 7.5  | 4.5 | 7.5 | 5.3 | 30 | 4.5 |
| CHRM2L1000Q6GL90        | 2      | 960   | 8.512  | 144 | 24 | 24.5  | 22.5  | 1  | 10 | 60 | 16       | 10   | 6   | 9.5 | 8.5 | 30 | 6   |
| CHRM2L500Q6GL90         | 2      | 480   | 8.512  | 72  | 24 | 24.5  | 22.5  | 1  | 10 | 60 | 8        | 10   | 6   | 9.5 | 8.5 | 30 | 6   |
| CHRM3L1000Q6GL90        | 3      | 960   | 10.286 | 96  | 29 | 29.75 | 26.75 | 2  | 10 | 60 | 16       | 11.5 | 7   | 11  | 9   | 30 | 7   |
| CHRM3L500Q6GL90         | 3      | 480   | 10.286 | 48  | 29 | 29.75 | 26.75 | 2  | 10 | 60 | 8        | 11.5 | 7   | 11  | 9   | 30 | 7   |
| CHRM4L1000Q6GL90        | 4      | 960   | 13.832 | 72  | 39 | 39.75 | 35.75 | 2  | 20 | 80 | 12       | 14   | 10  | 15  | 9   | 40 | 10  |
| CHRM4L500Q6GL90         | 4      | 480   | 13.832 | 36  | 39 | 39.75 | 35.75 | 2  | 20 | 80 | 6        | 14   | 10  | 15  | 9   | 40 | 10  |

Nota: Q8 bajo consulta.

## 1.4 Cremallera para guías lineales · 180° · Q6 · Q8



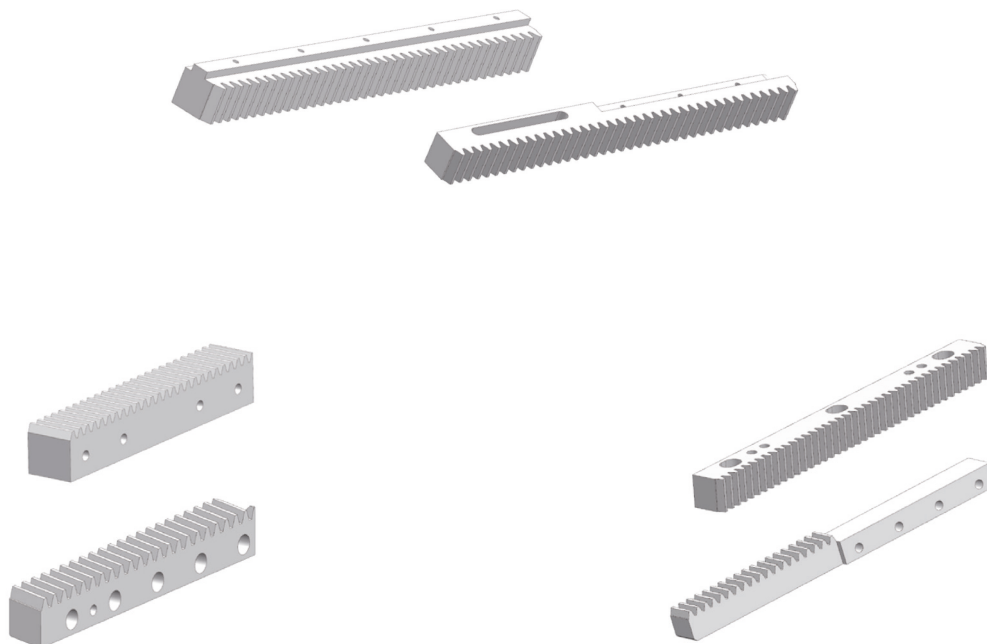
|                        |                       |                       |                        |
|------------------------|-----------------------|-----------------------|------------------------|
| » Calidad              | Q6                    | » Ángulo de hélice    | 19° 31' 42" (derecha)  |
| » Tratamiento dentado  | Rectificado           | » Material            | SAE1141                |
| » Resistencia a rotura | 800 N/mm <sup>2</sup> | » Tratamiento térmico | Templado por inducción |
| » Taladrado            | 180°                  |                       | HRC 56~60°             |

| Referencia               | Módulo | L TOT | L3     | Z   | B  | H     | Hp    | Sm | Lf | L1 | Nº perf. | Hf   | Df  | Dc | Hc | Ls | Ds | Bm   | Hm   |
|--------------------------|--------|-------|--------|-----|----|-------|-------|----|----|----|----------|------|-----|----|----|----|----|------|------|
| CHRM2L1000Q6GL180(20x20) | 2      | 960   | 6.739  | 144 | 19 | 19.5  | 17.50 | 1  | 10 | 60 | 16       | 7.5  | 5.8 | 10 | 6  | 30 | M4 | 7.5  | 8    |
| CHRM2L1000Q6GL180        | 2      | 960   | 8.512  | 144 | 24 | 24.5  | 22.50 | 1  | 10 | 60 | 16       | 10   | 7   | 11 | 7  | 30 | M5 | 10   | 11   |
| CHRM3L1000Q6GL180        | 3      | 960   | 10.286 | 96  | 29 | 29.75 | 26.75 | 2  | 10 | 60 | 16       | 11.5 | 10  | 15 | 9  | 30 | M6 | 11.5 | 13.5 |
| CHRM4L1000Q6GL180        | 4      | 960   | 13.832 | 72  | 39 | 39.75 | 35.75 | 2  | 20 | 80 | 12       | 14   | 12  | 18 | 12 | 40 | M8 | 14   | 16   |

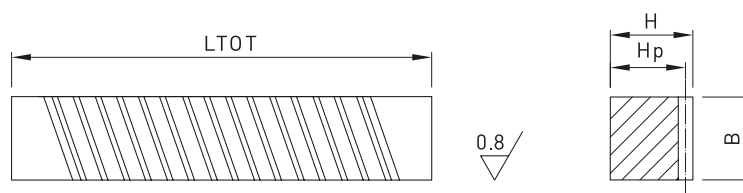
Nota: Q8 bajo consulta.

## 1.5 Cremallera customizada · No estándar

> Además de las especificaciones estándar incluidas en el catálogo, podemos **fabricar según los planos proporcionados** por el cliente.



## 1.6 Cremallera de montaje · Q6 · Q8



» **Calidad**

Q6 / Q8

» **Tratamiento dentado**

Rectificado

» **Ángulo de hélice**

19°31'42" (izquierda)

» **Material**

C45

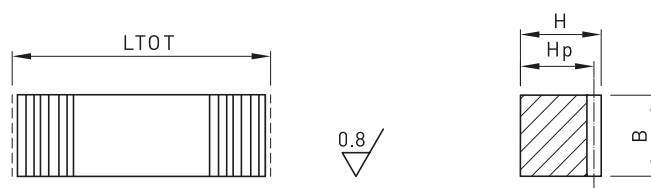
» **Tratamiento térmico**

Dientes endurecidos  
por inducción + bruñido

| Referencia               | Módulo | Longitud (L TOT) | Ancho |
|--------------------------|--------|------------------|-------|
| CHLM1.5L200Q6N (MONTAJE) | 1.5    | 200              | 20    |
| CHLM2L200Q6N (MONTAJE)   | 2      | 200              | 24    |
| CHLM3L200Q6N (MONTAJE)   | 3      | 200              | 29    |
| CHLM4L200Q6N (MONTAJE)   | 4      | 200              | 39    |
| CHLM5L200Q6N (MONTAJE)   | 5      | 200              | 49    |
| CHLM6L200Q6N (MONTAJE)   | 6      | 200              | 59    |
| CHLM8L200Q6N (MONTAJE)   | 8      | 200              | 79    |
| CHLM10L200Q6N (MONTAJE)  | 10     | 200              | 99    |

| Referencia               | Módulo | Longitud (L TOT) | Ancho |
|--------------------------|--------|------------------|-------|
| CHLM1.5L200Q8N (MONTAJE) | 1.5    | 200              | 20    |
| CHLM2L200Q8N (MONTAJE)   | 2      | 200              | 24    |
| CHLM3L200Q8N (MONTAJE)   | 3      | 200              | 29    |
| CHLM4L200Q8N (MONTAJE)   | 4      | 200              | 39    |
| CHLM5L200Q8N (MONTAJE)   | 5      | 200              | 49    |
| CHLM6L200Q8N (MONTAJE)   | 6      | 200              | 59    |
| CHLM8L200Q8N (MONTAJE)   | 8      | 200              | 79    |
| CHLM10L200Q8N (MONTAJE)  | 10     | 200              | 99    |

## 1.6 Cremallera de montaje · Serie 265



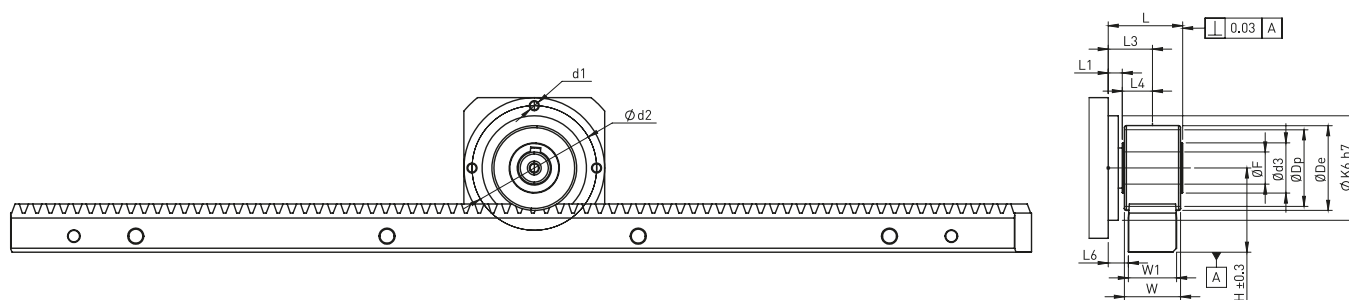
- » Tratamiento dentado Rectificado
- » Ángulo de inclinación 0°
- » Material C45
- » Tratamiento térmico Dientes endurecidos por inducción + bruñido

| Referencia              | Módulo | Longitud (L TOT) | Ancho |
|-------------------------|--------|------------------|-------|
| CRM1.5L200Q6N (MONTAJE) | 1.5    | 200              | 20    |
| CRM2L200Q6N (MONTAJE)   | 2      | 200              | 24    |
| CRM3L200Q6N (MONTAJE)   | 3      | 200              | 29    |
| CRM4L200Q6N (MONTAJE)   | 4      | 200              | 39    |
| CRM5L200Q6N (MONTAJE)   | 5      | 200              | 49    |
| CRM6L200Q6N (MONTAJE)   | 6      | 200              | 59    |
| CRM8L200Q6N (MONTAJE)   | 8      | 200              | 79    |
| CRM10L200Q6N (MONTAJE)  | 10     | 200              | 99    |

| Referencia              | Módulo | Longitud (L TOT) | Ancho |
|-------------------------|--------|------------------|-------|
| CRM1.5L200Q8N (MONTAJE) | 1.5    | 200              | 20    |
| CRM2L200Q8N (MONTAJE)   | 2      | 200              | 24    |
| CRM3L200Q8N (MONTAJE)   | 3      | 200              | 29    |
| CRM4L200Q8N (MONTAJE)   | 4      | 200              | 39    |
| CRM5L200Q8N (MONTAJE)   | 5      | 200              | 49    |
| CRM6L200Q8N (MONTAJE)   | 6      | 200              | 59    |
| CRM8L200Q8N (MONTAJE)   | 8      | 200              | 79    |
| CRM10L200Q8N (MONTAJE)  | 10     | 200              | 99    |



## 2 Engranajes de precisión · KPE · KPG · Q6

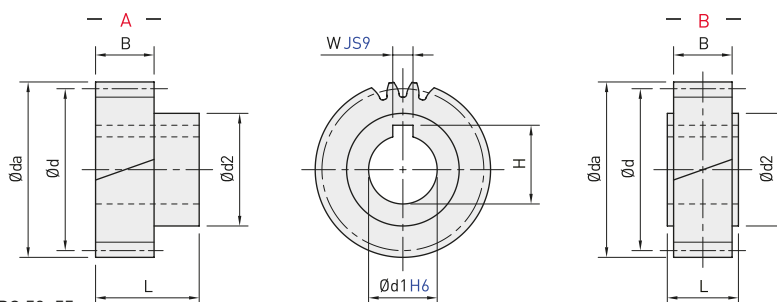


- » Calidad Q6
- » Tratamiento dentado Rectificado
- » Ángulo de hélice 19°31'42" (izquierda)
- » Material SCM415/SCM440
- » Tratamiento térmico HRC 50-55°

| Referencia      | Módulo | z  | H*<br>(mm) | W<br>(mm) | W1<br>(mm) | De<br>(mm) | Dp<br>(mm) | x<br>(mm) | K6 h7<br>(mm) | d1<br>(mm) | d2<br>(mm) | d3<br>(mm) | L1<br>(mm) | L<br>(mm) | L3<br>(mm) | L4<br>(mm) | L5<br>(mm) | L6<br>(mm) | ØF<br>(mm) | Peso<br>piñón<br>(mm) |
|-----------------|--------|----|------------|-----------|------------|------------|------------|-----------|---------------|------------|------------|------------|------------|-----------|------------|------------|------------|------------|------------|-----------------------|
| PHLM2Z18016K/Q6 | 2      | 18 | 41,89      | 26        | 24         | 43,80      | 38,20      | 0,4       | 52            | M5         | 62         | 30         | 8          | 42        | 27         | 19         | 7          | 15         | 16         | 0,2                   |
| PHLM2Z22022K/Q6 | 2      | 22 | 45,73      | 26        | 24         | 51,46      | 46,69      | 0,2       | 68            | M6         | 80         | 40         | 10         | 53        | 30         | 20         | 8          | 18         | 22         | 0,4                   |
| PHLM2Z26032K/Q6 | 2      | 26 | 49,58      | 26        | 24         | 59,17      | 55,17      | 0         | 90            | M8         | 108        | 45         | 12         | 79        | 33         | 21         | 9          | 21         | 32         | 0,5                   |
| PHLM3Z24040K/Q6 | 3      | 24 | 64,19      | 31        | 29         | 82,39      | 76,40      | 0         | 120           | M10        | 140        | 58         | 15         | 107       | 50,5       | 35,5       | 21         | 36         | 40         | 1,2                   |

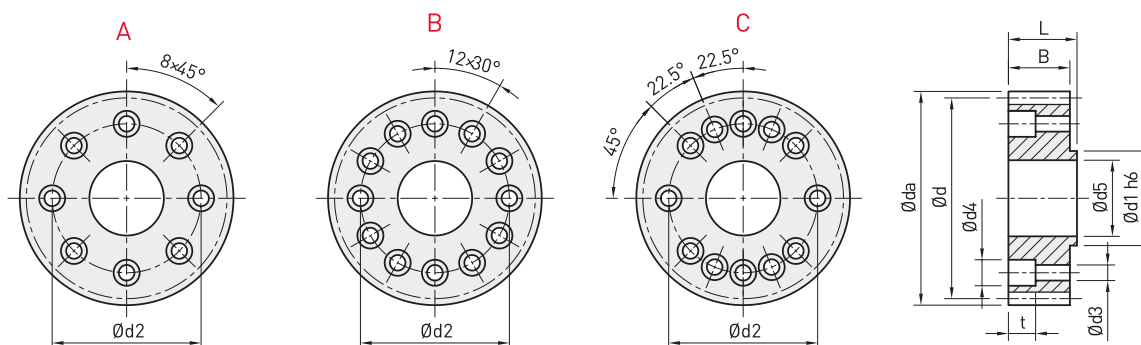
## 2 Engranajes de precisión · Q6

- » **Calidad** Q6
- » **Tratamiento dentado** Rectificado
- » **Norma del engranaje** DIN867
- » **Ángulo de presión** 20°
- » **Ángulo de hélice** 19°31'42"
- » **Material**
  - 1) 20CrMnTi
  - 2) 40Cr
- » **Tratamiento térmico**
  - 1) Cementado y templado: HRC 55-60
  - 2) Dientes templados por inducción: HRC 50-55



| Referencia         | Módulo | Z  | da      | d       | d1 | d2  | B   | L   | W  | H    | Fig. | kg   |
|--------------------|--------|----|---------|---------|----|-----|-----|-----|----|------|------|------|
| PHLM1.5Z20016K/Q6B | 1,5    | 20 | 34,831  | 31,831  | 16 | 25  | 20  | 22  | 5  | 18,3 | B    | 0,13 |
| PHLM1.5Z21016K/Q6A | 1,5    | 21 | 36,423  | 33,423  | 16 | 30  | 20  | 46  | 5  | 18,3 | A    | 0,15 |
| PHLM2Z20019K/Q6B   | 2      | 20 | 46,441  | 42,441  | 19 | 30  | 28  | 30  | 6  | 21,8 | B    | 0,3  |
| PHLM2Z20019K/Q6A   | 2      | 20 | 46,441  | 42,441  | 19 | 30  | 28  | 56  | 6  | 21,8 | A    | 0,3  |
| PHLM2Z20022K/Q6B   | 2      | 20 | 46,441  | 42,441  | 22 | 30  | 28  | 30  | 6  | 24,8 | B    | 0,3  |
| PHLM2Z20022K/Q6A   | 2      | 20 | 46,441  | 42,441  | 22 | 36  | 28  | 56  | 6  | 24,8 | A    | 0,3  |
| PHLM2Z22019K/Q6B   | 2      | 22 | 50,686  | 46,686  | 19 | 30  | 28  | 30  | 6  | 21,8 | B    | 0,2  |
| PHLM2Z22019K/Q6A   | 2      | 22 | 50,686  | 46,686  | 19 | 30  | 28  | 56  | 6  | 21,8 | A    | 0,4  |
| PHLM2Z22022K/Q6B   | 2      | 22 | 50,686  | 46,686  | 22 | 30  | 28  | 30  | 6  | 24,8 | B    | 0,3  |
| PHLM2Z22022K/Q6A   | 2      | 22 | 50,686  | 46,686  | 22 | 36  | 28  | 56  | 6  | 24,8 | A    | 0,4  |
| PHLM2Z25022K/Q6B   | 2      | 25 | 57,052  | 53,052  | 22 | 30  | 28  | 30  | 6  | 24,8 | B    | 0,3  |
| PHLM2Z25022K/Q6A   | 2      | 25 | 57,052  | 53,052  | 22 | 36  | 28  | 56  | 6  | 24,8 | A    | 0,5  |
| PHLM2Z25025K/Q6B   | 2      | 25 | 57,052  | 53,052  | 25 | 36  | 28  | 30  | 8  | 28,3 | B    | 0,4  |
| PHLM2Z28019K/Q6B   | 2      | 28 | 63,418  | 59,418  | 19 | 30  | 28  | 30  | 6  | 21,8 | B    | 0,4  |
| PHLM2Z28019K/Q6A   | 2      | 28 | 63,418  | 59,418  | 19 | 30  | 28  | 56  | 6  | 21,8 | A    | 0,6  |
| PHLM2Z28022K/Q6B   | 2      | 28 | 63,418  | 59,418  | 22 | 30  | 28  | 30  | 6  | 24,8 | B    | 0,4  |
| PHLM2Z28022K/Q6A   | 2      | 28 | 63,418  | 59,418  | 22 | 36  | 28  | 56  | 6  | 24,8 | A    | 0,7  |
| PHLM2Z30030K/Q6B   | 2      | 30 | 67,662  | 63,662  | 30 | 45  | 28  | 30  | 8  | 33,3 | B    | 0,6  |
| PHLM2Z30030K/Q6A   | 2      | 30 | 67,662  | 63,662  | 30 | 50  | 28  | 60  | 8  | 33,3 | A    | 0,8  |
| PHLM2Z32022K/Q6B   | 2      | 32 | 71,906  | 67,906  | 22 | 30  | 28  | 30  | 6  | 24,8 | B    | 0,7  |
| PHLM2Z32022K/Q6A   | 2      | 32 | 71,906  | 67,906  | 22 | 36  | 28  | 56  | 6  | 24,8 | A    | 0,9  |
| PHLM2Z32025K/Q6B   | 2      | 32 | 71,906  | 67,906  | 25 | 36  | 28  | 30  | 8  | 28,3 | B    | 0,7  |
| PHLM2Z32035K/Q6B   | 2      | 32 | 71,906  | 67,906  | 35 | 48  | 28  | 30  | 10 | 38,3 | B    | 0,6  |
| PHLM3Z20030K/Q6B   | 3      | 20 | 69,661  | 63,662  | 30 | 45  | 28  | 30  | 8  | 33,3 | B    | 0,8  |
| PHLM3Z20030K/Q6A   | 3      | 20 | 69,661  | 63,662  | 30 | 50  | 28  | 60  | 8  | 33,3 | A    | 0,8  |
| PHLM3Z22025K/Q6B   | 3      | 22 | 76,028  | 70,028  | 25 | 36  | 28  | 30  | 8  | 28,3 | B    | 0,8  |
| PHLM3Z22030K/Q6B   | 3      | 22 | 76,028  | 70,028  | 30 | 45  | 28  | 30  | 8  | 33,3 | B    | 0,7  |
| PHLM3Z22032K/Q6A   | 3      | 22 | 76,028  | 70,028  | 32 | 55  | 28  | 65  | 10 | 35,3 | A    | 1,0  |
| PHLM3Z22035K/Q6B   | 3      | 22 | 76,028  | 70,028  | 35 | 48  | 28  | 30  | 10 | 38,3 | B    | 0,7  |
| PHLM3Z25025K/Q6B   | 3      | 25 | 85,578  | 79,578  | 25 | 36  | 28  | 30  | 8  | 28,3 | B    | 1,0  |
| PHLM3Z25025K/Q6A   | 3      | 25 | 85,578  | 79,578  | 25 | 44  | 28  | 60  | 8  | 28,3 | A    | 1,1  |
| PHLM3Z25032K/Q6A   | 3      | 25 | 85,578  | 79,578  | 32 | 55  | 28  | 65  | 10 | 35,3 | A    | 1,2  |
| PHLM3Z25035K/Q6B   | 3      | 25 | 85,578  | 79,578  | 35 | 48  | 28  | 30  | 10 | 38,3 | B    | 0,9  |
| PHLM3Z25035K/Q6A   | 3      | 25 | 85,578  | 79,578  | 35 | 55  | 28  | 65  | 10 | 38,3 | A    | 1,1  |
| PHLM3Z25040K/Q6B   | 3      | 25 | 85,578  | 79,578  | 40 | 62  | 28  | 65  | 12 | 43,3 | B    | 1,1  |
| PHLM3Z25040K/Q6A   | 3      | 25 | 85,578  | 79,578  | 40 | 70  | 28  | 50  | 12 | 43,3 | A    | 1,1  |
| PHLM3Z32032K/Q6A   | 3      | 32 | 107,859 | 101,859 | 32 | 55  | 28  | 65  | 10 | 35,3 | A    | 2,1  |
| PHLM3Z32040K/Q6A   | 3      | 32 | 107,859 | 101,859 | 40 | 62  | 28  | 65  | 12 | 43,3 | A    | 2,1  |
| PHLM4Z20035K/Q6B   | 4      | 20 | 92,883  | 84,883  | 35 | 52  | 40  | 50  | 10 | 38,3 | B    | 1,9  |
| PHLM4Z21032K/Q6A   | 4      | 21 | 97,127  | 89,127  | 32 | 55  | 40  | 75  | 10 | 35,3 | A    | 2,0  |
| PHLM4Z21035K/Q6A   | 4      | 21 | 97,127  | 89,127  | 35 | 55  | 40  | 75  | 10 | 38,3 | A    | 1,9  |
| PHLM4Z21040K/Q6A   | 4      | 21 | 97,127  | 89,127  | 40 | 62  | 40  | 75  | 12 | 43,3 | A    | 1,9  |
| PHLM4Z21045K/Q6A   | 4      | 21 | 97,127  | 89,127  | 45 | 68  | 40  | 75  | 14 | 48,8 | A    | 1,7  |
| PHLM4Z24032K/Q6A   | 4      | 24 | 109,859 | 101,859 | 32 | 55  | 40  | 75  | 10 | 35,3 | A    | 2,6  |
| PHLM4Z24035K/Q6A   | 4      | 24 | 109,859 | 101,859 | 35 | 55  | 40  | 75  | 10 | 38,3 | A    | 2,5  |
| PHLM4Z24045K/Q6A   | 4      | 24 | 109,859 | 101,859 | 45 | 68  | 40  | 75  | 14 | 48,8 | A    | 2,3  |
| PHLM4Z25045K/Q6B   | 4      | 25 | 114,103 | 106,103 | 45 | 65  | 40  | 50  | 14 | 48,8 | B    | 2,8  |
| PHLM5Z18045K/Q6A   | 5      | 18 | 105,493 | 95,493  | 45 | 68  | 50  | 85  | 14 | 48,8 | A    | 2,7  |
| PHLM5Z24045K/Q6A   | 5      | 24 | 137,324 | 127,324 | 45 | 68  | 50  | 85  | 14 | 48,8 | A    | 4,9  |
| PHLM5Z24055K/Q6A   | 5      | 24 | 137,324 | 127,324 | 55 | 80  | 50  | 90  | 16 | 59,3 | A    | 4,9  |
| PHLM6Z20055K/Q6A   | 6      | 20 | 139,324 | 127,324 | 55 | 80  | 60  | 100 | 16 | 59,3 | A    | 5,7  |
| PHLM6Z25075K/Q6A   | 6      | 25 | 171,155 | 159,155 | 75 | 110 | 60  | 120 | 20 | 79,9 | A    | 9,6  |
| PHLM8Z20085K/Q6A   | 8      | 20 | 185,766 | 169,766 | 85 | 125 | 80  | 145 | 22 | 90,4 | A    | 13,6 |
| PHLM10Z20085K/Q6A  | 10     | 20 | 232,207 | 212,207 | 85 | 125 | 100 | 165 | 22 | 90,4 | A    | 26,2 |

## 2 Engranajes de precisión con brida · Q6



- » Calidad
- » Tratamiento dentado
- » Norma engranaje
- » Ángulo de presión

Q6  
Rectificado  
DIN867  
20°

- » Ángulo de hélice
- » Material
- » Tratamiento térmico

19°31'42"  
20CrMnTi  
HRC 55~60°

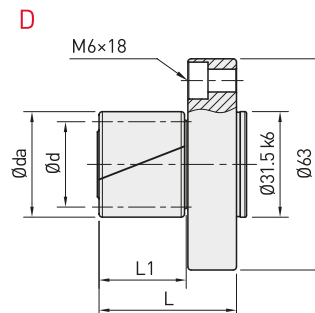
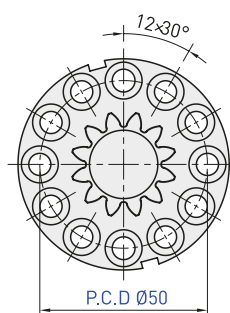
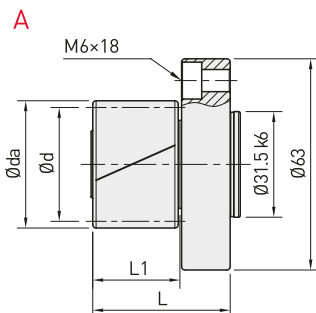
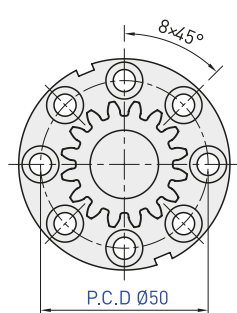
| Referencia       | Mód. | z  | X     | da      | d       | dw      | d1 h6 | d2    | d3   | d4   | d5   | t    | B  | L  | nxd     | Forma |
|------------------|------|----|-------|---------|---------|---------|-------|-------|------|------|------|------|----|----|---------|-------|
| PHLM2Z26031.5Q6A | 2    | 26 | 0,407 | 60,800  | 55,174  | 56,800  | 20,0  | 31,5  | 5,5  | 9,5  | 16,2 | 12,0 | 26 | 29 | 173,334 | A     |
| PHLM2Z27031.5Q6A | 2    | 27 | 0,000 | 61,296  | 57,296  | 57,296  | 20,0  | 31,5  | 5,5  | 9,5  | 16,2 | 11,0 | 30 | 33 | 180,000 | A     |
| PHLM2Z29031.5Q6A | 2    | 29 | 0,415 | 67,200  | 61,540  | 63,200  | 20,0  | 31,5  | 5,5  | 9,5  | 16,2 | 12,0 | 26 | 29 | 193,334 | A     |
| PHLM2Z35031.5Q6A | 2    | 35 | 0,382 | 79,800  | 74,272  | 75,800  | 20,0  | 31,5  | 5,5  | 9,5  | 16,2 | 12,0 | 26 | 29 | 233,334 | A     |
| PHLM2Z29040Q6A   | 2    | 29 | 0,415 | 67,200  | 61,540  | 63,200  | 25,0  | 40,0  | 6,6  | 11,0 | 20,3 | 10,5 | 26 | 29 | 193,334 | A     |
| PHLM2Z33050Q6A   | 2    | 33 | 0,393 | 75,599  | 70,028  | 71,599  | 31,5  | 50,0  | 6,6  | 11,0 | 23,7 | 14,0 | 26 | 29 | 220,000 | A     |
| PHLM2Z36050Q6A   | 2    | 36 | 0,000 | 80,394  | 76,394  | 76,394  | 31,5  | 50,0  | 6,6  | 11,0 | 23,7 | 8,0  | 30 | 33 | 240,000 | A     |
| PHLM2Z37050Q6A   | 2    | 37 | 0,421 | 84,200  | 78,517  | 80,200  | 31,5  | 50,0  | 6,6  | 11,0 | 23,7 | 14,0 | 26 | 29 | 246,667 | A     |
| PHLM2Z37050Q6B   | 2    | 37 | 0,421 | 84,200  | 78,517  | 80,200  | 31,5  | 50,0  | 6,6  | 11,0 | 23,7 | 14,0 | 26 | 29 | 246,667 | B     |
| PHLM2Z40063Q6C   | 2    | 40 | 0,379 | 90,400  | 84,883  | 86,400  | 40,0  | 63,0  | 6,6  | 11,0 | 32,2 | 11,5 | 26 | 29 | 266,667 | C     |
| PHLM2Z45063Q6C   | 2    | 45 | 0,327 | 100,800 | 95,493  | 96,800  | 40,0  | 63,0  | 6,6  | 11,0 | 32,2 | 11,5 | 26 | 29 | 300,000 | C     |
| PHLM3Z30063Q6C   | 3    | 30 | 0,000 | 101,493 | 95,493  | 95,493  | 40,0  | 63,0  | 6,6  | 11,0 | 32,2 | 9,5  | 35 | 39 | 300,000 | C     |
| PHLM3Z31050Q6A   | 3    | 31 | 0,354 | 106,800 | 98,676  | 100,800 | 31,5  | 50,0  | 6,6  | 11,0 | 23,7 | 9,0  | 31 | 35 | 310,000 | A     |
| PHLM3Z35080Q6B   | 3    | 35 | 0,365 | 119,600 | 111,409 | 113,600 | 50,0  | 80,0  | 9,0  | 14,0 | 32,2 | 10,5 | 31 | 35 | 350,000 | B     |
| PHLM3Z40080Q6B   | 3    | 40 | 0,379 | 135,599 | 127,324 | 129,599 | 50,0  | 80,0  | 9,0  | 14,0 | 32,2 | 10,5 | 31 | 35 | 400,000 | B     |
| PHLM4Z30080Q6B   | 4    | 30 | 0,000 | 135,324 | 127,324 | 127,324 | 50,0  | 80,0  | 9,0  | 14,0 | 32,2 | 9,5  | 45 | 49 | 400,000 | B     |
| PHLM4Z380125Q6B  | 4    | 38 | 0,240 | 171,200 | 161,277 | 163,200 | 80,0  | 125,0 | 11,0 | 17,5 | 56,1 | 10,5 | 41 | 45 | 506,667 | B     |
| PHLM5Z21080Q6B   | 5    | 21 | 0,000 | 121,409 | 111,409 | 111,409 | 50,0  | 80,0  | 9,0  | 14,0 | 32,2 | 11,5 | 59 | 64 | 350,000 | B     |
| PHLM5Z360125Q6B  | 5    | 36 | 0,000 | 200,986 | 190,986 | 190,986 | 80,0  | 125,0 | 11,0 | 17,5 | 56,1 | 12,5 | 55 | 60 | 600,000 | B     |

Nota: La unión atornillada limita el par máximo transmisible. Consulte la siguiente tabla para conocer el par máximo admisible.

Tabla de pares máximos admisibles

| d1h6 | d2   | Métrica del tornillo | Par máximo transmisible (Nm) |
|------|------|----------------------|------------------------------|
| 20   | 31.5 | M5                   | 75                           |
| 25   | 40   | M6                   | 140                          |
| 31.5 | 50   | M6                   | 175                          |
| 40   | 63   | M6                   | 335                          |
| 50   | 80   | M8                   | 810                          |
| 80   | 125  | M10                  | 2055                         |

## 2 Engranajes de precisión · KPH90 · Ø50



- » Calidad
- » Tratamiento dentado
- » Norma engranaje
- » Ángulo de presión

Q6  
Rectificado  
DIN867  
20°

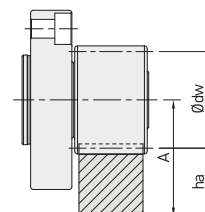
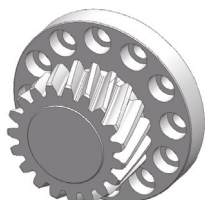
- » Ángulo de hélice
- » Material
- » Tratamiento térmico

19°31'42"  
Placa: S45C sin tratamiento  
Engranaje: 20CrMnTi  
Cementado, HRC 55~60°

| Referencia     | Módulo | z  | X    | da     | d      | dw     | L    | L1   | nxd     | Forma |
|----------------|--------|----|------|--------|--------|--------|------|------|---------|-------|
| PHLM2Z12Ø50Q6A | 2      | 12 | 0.50 | 31,465 | 25,465 | 27,465 | 41,0 | 26,0 | 80,000  | A     |
| PHLM2Z12Ø50Q6D | 2      | 12 | 0,50 | 31,465 | 25,465 | 27,465 | 41,0 | 26,0 | 80,000  | D     |
| PHLM2Z16Ø50Q6A | 2      | 16 | 0,00 | 37,953 | 33,953 | 33,953 | 41,0 | 26,0 | 106,667 | A     |
| PHLM2Z16Ø50Q6D | 2      | 16 | 0,00 | 37,953 | 33,953 | 33,953 | 41,0 | 26,0 | 106,667 | D     |

Nota: La unión atornillada limita el par máximo transmisible.

### Engranajes rectificadas con placa soldada



$$A = ha + \frac{\text{Ødw}}{2}$$

#### Tabla de referencia del par máximo admisible

La resistencia de los tornillos limita el par máximo transmisible. Consulte la siguiente tabla.

| Ø de l círculo de tornillos | Tamaño del tornillo | Par máximo |
|-----------------------------|---------------------|------------|
| Ø 50                        | M6 x 8 pcs          | 175        |
|                             | M6 x 12 pcs         | 265        |
| Ø 63                        | M6 x 12 pcs         | 335        |
|                             | M8 x 12 pcs         | 640        |
| Ø 80                        | M8 x 12 pcs         | 810        |
|                             | M8 x 16 pcs         | 1160       |
| Ø 125                       | M10 x 12 pcs        | 2055       |
|                             | M10 x 16 pcs        | 2745       |
|                             | M12 x 12 pcs        | 3060       |
| Ø 140                       | M16 x 12 pcs        | 6620       |
| Ø 145                       | M20 x 12 pcs        | 10885      |
| Ø 160                       | M20 x 12 pcs        | 12000      |
|                             | M24 x 12 pcs        | 18160      |

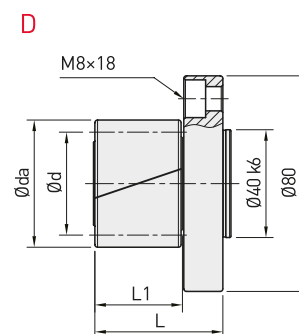
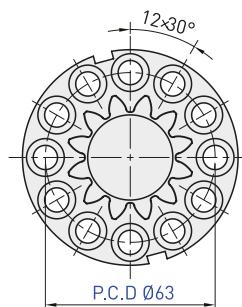
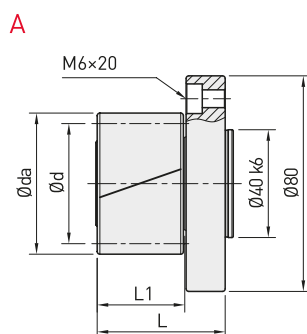
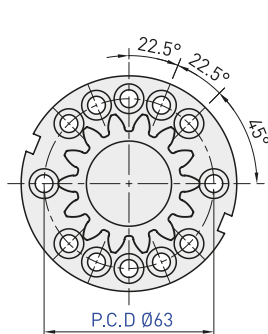
Nota: Cementado y templado, con dureza superficial de 60 HRC. Para reducir el ruido y mejorar la resistencia al desgaste, la superficie de los dientes está rectificada y acabada. Los accesorios incluyen tornillos Allen (resistencia 12.9, DIN 912). La resistencia de los tornillos limita el par máximo transmisible.

#### Tabla de pares de apriete recomendados para tornillos

Par de apriete recomendado para el tornillo.

| Tornillos   | Par de apriete de tornillos |
|-------------|-----------------------------|
| M5 x 0.8P   | 9.8                         |
| M6 x 1P     | 17                          |
| M8 x 1.25P  | 41                          |
| M10 x 1.5P  | 80                          |
| M12 x 1.75P | 139                         |
| M16 x 2P    | 343                         |
| M20 x 2.5P  | 392                         |
| M24 x 3P    | 1190                        |
| M30 x 3.58P | 2380                        |
| M36 x 4P    | 4136                        |

## 2 Engranajes de precisión · KPH120 · Ø63



- » Calidad
- » Tratamiento dentado
- » Norma engranaje
- » Ángulo de presión

Q6  
Rectificado  
DIN867  
20°

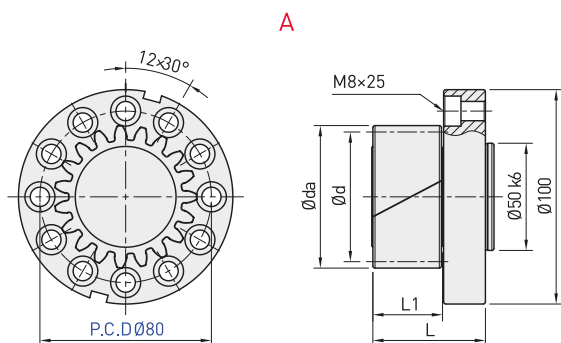
- » Ángulo de hélice
- » Material
- » Tratamiento térmico

19°31'42"  
Placa: S45C sin tratamiento  
Engranaje: 20CrMnTi  
Cementado, HRC 55~60°

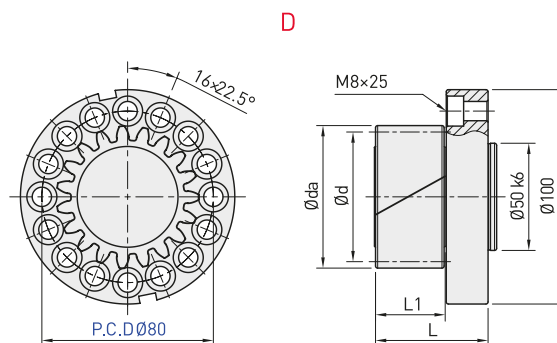
| Referencia     | Módulo | z  | X    | da     | d      | dw     | L    | L1   | nxd     | Forma |
|----------------|--------|----|------|--------|--------|--------|------|------|---------|-------|
| PHLM2Z12Ø63Q6A | 2      | 12 | 0.50 | 31,465 | 25,465 | 27,465 | 41,0 | 26,0 | 80,000  | A     |
| PHLM2Z12Ø63Q6D | 2      | 12 | 0,50 | 31,465 | 25,465 | 27,465 | 41,0 | 26,0 | 80,000  | D     |
| PHLM2Z17Ø63Q6A | 2      | 17 | 0,00 | 40,075 | 36,075 | 36,075 | 41,0 | 26,0 | 113,333 | A     |
| PHLM2Z17Ø63Q6D | 2      | 17 | 0,00 | 40,075 | 36,075 | 36,075 | 41,0 | 26,0 | 113,333 | D     |
| PHLM2Z19Ø63Q6A | 2      | 19 | 0,00 | 44,319 | 40,319 | 40,319 | 41,0 | 26,0 | 126,667 | A     |
| PHLM2Z19Ø63Q6D | 2      | 19 | 0,00 | 44,319 | 40,319 | 40,319 | 41,0 | 26,0 | 126,667 | D     |
| PHLM2Z23Ø63Q6A | 2      | 23 | 0,00 | 52,808 | 48,808 | 48,808 | 41,0 | 26,0 | 153,334 | A     |
| PHLM3Z12Ø63Q6A | 3      | 12 | 0,50 | 47,197 | 38,197 | 41,197 | 47,5 | 32,5 | 120,000 | A     |
| PHLM3Z12Ø63Q6D | 3      | 12 | 0,50 | 47,197 | 38,197 | 41,197 | 47,5 | 32,5 | 120,000 | D     |
| PHLM3Z14Ø63Q6A | 3      | 14 | 0,30 | 52,363 | 44,563 | 46,363 | 47,5 | 32,5 | 140,000 | A     |

Nota: La unión atornillada limita el par máximo transmisible. Consulte la tabla de la página 35.

## 2 Engranajes de precisión · KPH160 · Ø80



- » Calidad Q6
- » Tratamiento dentado Rectificado
- » Norma engranaje DIN867
- » Ángulo de presión 20°

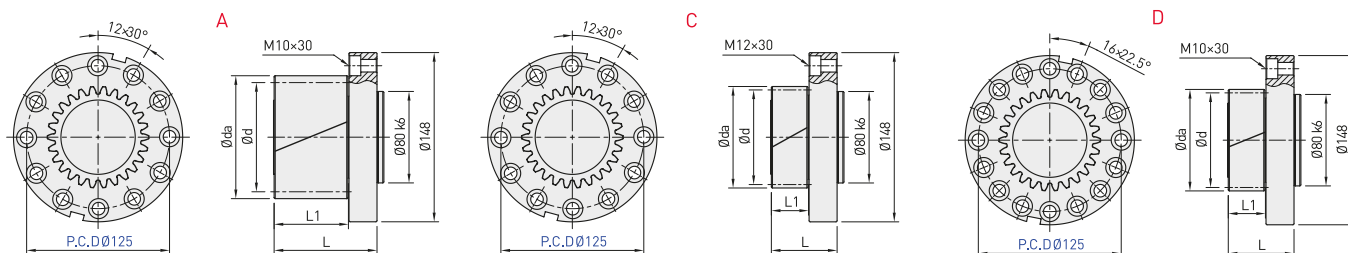


- » Ángulo de hélice 19°31'42"
- » Material Placa: S45C sin tratamiento
- » Tratamiento térmico Engranaje: 20CrMnTi
- Cementado, HRC 55~60°

| Referencia     | Módulo | z  | X    | da     | d      | dw     | L    | L1   | nxd     | Forma |
|----------------|--------|----|------|--------|--------|--------|------|------|---------|-------|
| PHLM2Z12Ø80Q6A | 2      | 12 | 0.50 | 31,465 | 25,465 | 27,465 | 46,0 | 26,0 | 80,000  | A     |
| PHLM2Z12Ø80Q6D | 2      | 12 | 0,50 | 31,465 | 25,465 | 27,465 | 46,0 | 26,0 | 80,000  | D     |
| PHLM2Z23Ø80Q6A | 2      | 23 | 0,00 | 52,808 | 48,808 | 48,808 | 46,0 | 26,0 | 153,334 | A     |
| PHLM2Z23Ø80Q6D | 2      | 23 | 0,00 | 52,808 | 48,808 | 48,808 | 46,0 | 26,0 | 153,334 | D     |
| PHLM2Z29Ø80Q6A | 2      | 29 | 0,00 | 65,540 | 61,540 | 61,540 | 46,0 | 26,0 | 193,334 | A     |
| PHLM2Z29Ø80Q6D | 2      | 29 | 0,00 | 65,540 | 61,540 | 61,540 | 46,0 | 26,0 | 193,334 | D     |
| PHLM3Z12Ø80Q6A | 3      | 12 | 0.50 | 47,197 | 38,197 | 41,197 | 52,5 | 32,5 | 120,000 | A     |
| PHLM3Z12Ø80Q6D | 3      | 12 | 0,50 | 47,197 | 38,197 | 41,197 | 52,5 | 32,5 | 120,000 | D     |
| PHLM3Z16Ø80Q6A | 3      | 16 | 0,00 | 56,930 | 50,930 | 50,930 | 52,5 | 32,5 | 160,000 | A     |
| PHLM3Z16Ø80Q6D | 3      | 16 | 0,00 | 56,930 | 50,930 | 50,930 | 52,5 | 32,5 | 160,000 | D     |
| PHLM3Z17Ø80Q6A | 3      | 17 | 0,00 | 60,113 | 54,113 | 54,113 | 52,5 | 32,5 | 170,000 | A     |
| PHLM3Z17Ø80Q6D | 3      | 17 | 0,00 | 60,113 | 54,113 | 54,113 | 52,5 | 32,5 | 170,000 | D     |
| PHLM3Z19Ø80Q6A | 3      | 19 | 0,00 | 66,479 | 60,479 | 60,479 | 52,5 | 32,5 | 190,000 | A     |
| PHLM3Z19Ø80Q6D | 3      | 19 | 0,00 | 66,479 | 60,479 | 60,479 | 52,5 | 32,5 | 190,000 | D     |
| PHLM4Z12Ø80Q6A | 4      | 12 | 0,50 | 62,930 | 50,930 | 54,930 | 65,0 | 45,0 | 160,000 | A     |
| PHLM4Z12Ø80Q6D | 4      | 12 | 0,50 | 62,930 | 50,930 | 54,930 | 65,0 | 45,0 | 160,000 | D     |

Nota: La unión atornillada limita el par máximo transmisible. Consulte la tabla de la página 35.

## 2 Engranajes de precisión · KPH205 · Ø125



- » Calidad
- » Tratamiento dentado
- » Norma engranaje
- » Ángulo de presión

Q6  
Rectificado  
DIN867  
20°

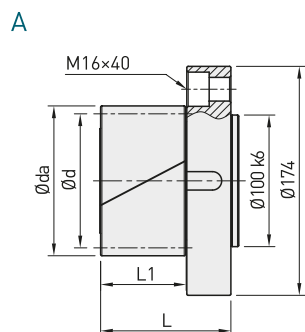
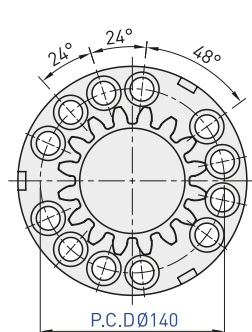
- » Ángulo de hélice
- » Material
- » Tratamiento térmico

19°31'42"  
Placa: S45C sin tratamiento  
Engranaje: 20CrMnTi  
Cementado, HRC 55~60°

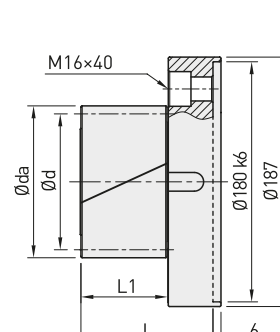
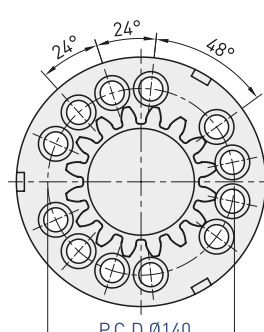
| Referencia      | Módulo | z  | X    | da      | d       | dw      | L    | L1   | nxd     | Forma |
|-----------------|--------|----|------|---------|---------|---------|------|------|---------|-------|
| PHLM3Z120125Q6A | 3      | 12 | 0,50 | 41,197  | 38,197  | 41,197  | 57,5 | 32,5 | 120,000 | A     |
| PHLM3Z120125Q6C | 3      | 12 | 0,50 | 41,197  | 38,197  | 41,197  | 57,5 | 32,5 | 120,000 | C     |
| PHLM3Z120125Q6D | 3      | 12 | 0,50 | 41,197  | 38,197  | 41,197  | 57,5 | 32,5 | 120,000 | D     |
| PHLM3Z190125Q6A | 3      | 19 | 0,00 | 66,479  | 60,479  | 60,479  | 57,5 | 32,5 | 190,000 | A     |
| PHLM3Z190125Q6C | 3      | 19 | 0,00 | 66,479  | 60,479  | 60,479  | 57,5 | 32,5 | 190,000 | C     |
| PHLM3Z190125Q6D | 3      | 19 | 0,00 | 66,479  | 60,479  | 60,479  | 57,5 | 32,5 | 190,000 | D     |
| PHLM3Z250125Q6A | 3      | 25 | 0,00 | 85,578  | 79,578  | 79,578  | 57,5 | 32,5 | 250,000 | A     |
| PHLM3Z250125Q6D | 3      | 25 | 0,00 | 85,578  | 79,578  | 79,578  | 57,5 | 32,5 | 250,000 | D     |
| PHLM3Z260125Q6A | 3      | 26 | 0,00 | 88,761  | 82,761  | 82,761  | 57,5 | 32,5 | 260,000 | A     |
| PHLM3Z260125Q6C | 3      | 26 | 0,00 | 88,761  | 82,761  | 82,761  | 57,5 | 32,5 | 260,000 | C     |
| PHLM3Z260125Q6D | 3      | 26 | 0,00 | 88,761  | 82,761  | 82,761  | 57,5 | 32,5 | 260,000 | D     |
| PHLM3Z320125Q6A | 3      | 32 | 0,00 | 107,859 | 101,859 | 101,859 | 57,5 | 32,5 | 320,000 | A     |
| PHLM3Z320125Q6D | 3      | 32 | 0,00 | 107,859 | 101,859 | 101,859 | 57,5 | 32,5 | 320,000 | D     |
| PHLM4Z120125Q6A | 4      | 12 | 0,50 | 62,930  | 50,930  | 54,930  | 70,0 | 45,0 | 160,000 | A     |
| PHLM4Z120125Q6C | 4      | 12 | 0,50 | 62,930  | 50,930  | 54,930  | 70,0 | 45,0 | 160,000 | C     |
| PHLM4Z120125Q6D | 4      | 12 | 0,50 | 62,930  | 50,930  | 54,930  | 70,0 | 45,0 | 160,000 | D     |
| PHLM4Z150125Q6A | 4      | 15 | 0,00 | 71,662  | 63,662  | 63,662  | 70,0 | 45,0 | 200,000 | A     |
| PHLM4Z150125Q6D | 4      | 15 | 0,00 | 71,662  | 63,662  | 63,662  | 70,0 | 45,0 | 200,000 | D     |
| PHLM4Z160125Q6A | 4      | 16 | 0,00 | 75,906  | 67,906  | 67,906  | 70,0 | 45,0 | 213,334 | A     |
| PHLM4Z160125Q6D | 4      | 16 | 0,00 | 75,906  | 67,906  | 67,906  | 70,0 | 45,0 | 213,334 | D     |
| PHLM4Z170125Q6A | 4      | 17 | 0,00 | 80,150  | 72,150  | 72,150  | 70,0 | 45,0 | 226,667 | A     |
| PHLM4Z170125Q6C | 4      | 17 | 0,00 | 80,150  | 72,150  | 72,150  | 70,0 | 45,0 | 226,667 | C     |
| PHLM4Z170125Q6D | 4      | 17 | 0,00 | 80,150  | 72,150  | 72,150  | 70,0 | 45,0 | 226,667 | D     |
| PHLM4Z190125Q6A | 4      | 19 | 0,11 | 80,519  | 80,639  | 81,519  | 70,0 | 45,0 | 253,334 | A     |
| PHLM4Z190125Q6C | 4      | 19 | 0,11 | 80,519  | 80,639  | 81,519  | 70,0 | 45,0 | 253,334 | C     |
| PHLM4Z190125Q6D | 4      | 19 | 0,11 | 80,519  | 80,639  | 81,519  | 70,0 | 45,0 | 253,334 | D     |
| PHLM4Z200125Q6A | 4      | 20 | 0,00 | 92,883  | 84,883  | 84,883  | 70,0 | 45,0 | 266,667 | A     |
| PHLM4Z200125Q6C | 4      | 20 | 0,00 | 92,883  | 84,883  | 84,883  | 70,0 | 45,0 | 266,667 | C     |
| PHLM4Z200125Q6D | 4      | 20 | 0,00 | 92,883  | 84,883  | 84,883  | 70,0 | 45,0 | 266,667 | D     |
| PHLM4Z230125Q6A | 4      | 23 | 0,00 | 105,615 | 97,615  | 97,615  | 70,0 | 45,0 | 306,667 | A     |
| PHLM4Z230125Q6D | 4      | 23 | 0,00 | 105,615 | 97,615  | 97,615  | 70,0 | 45,0 | 306,667 | D     |
| PHLM5Z120125Q6A | 5      | 12 | 0,50 | 78,662  | 63,662  | 68,662  | 80,0 | 55,0 | 200,000 | A     |
| PHLM5Z120125Q6C | 5      | 12 | 0,50 | 78,662  | 63,662  | 68,662  | 80,0 | 55,0 | 200,000 | C     |
| PHLM5Z120125Q6D | 5      | 12 | 0,50 | 78,662  | 63,662  | 68,662  | 80,0 | 55,0 | 200,000 | D     |
| PHLM5Z160125Q6A | 5      | 16 | 0,00 | 94,883  | 84,883  | 84,883  | 80,0 | 55,0 | 266,667 | A     |
| PHLM5Z160125Q6C | 5      | 16 | 0,00 | 94,883  | 84,883  | 84,883  | 80,0 | 55,0 | 266,667 | C     |
| PHLM5Z160125Q6D | 5      | 16 | 0,00 | 94,883  | 84,883  | 84,883  | 80,0 | 55,0 | 266,667 | D     |
| PHLM5Z180125Q6A | 5      | 18 | 0,00 | 105,493 | 95,493  | 95,493  | 80,0 | 55,0 | 300,000 | A     |
| PHLM5Z180125Q6C | 5      | 18 | 0,00 | 105,493 | 95,493  | 95,493  | 80,0 | 55,0 | 300,000 | C     |
| PHLM5Z180125Q6D | 5      | 18 | 0,00 | 105,493 | 95,493  | 95,493  | 80,0 | 55,0 | 300,000 | D     |
| PHLM6Z120125Q6A | 6      | 12 | 0,50 | 94,394  | 76,394  | 82,394  | 90,0 | 65,0 | 240,000 | A     |
| PHLM6Z120125Q6C | 6      | 12 | 0,50 | 94,394  | 76,394  | 82,394  | 90,0 | 65,0 | 240,000 | C     |
| PHLM6Z120125Q6D | 6      | 12 | 0,50 | 94,394  | 76,394  | 82,394  | 90,0 | 65,0 | 240,000 | D     |
| PHLM6Z130125Q6A | 6      | 13 | 0,50 | 100,761 | 82,761  | 88,761  | 90,0 | 65,0 | 260,000 | A     |
| PHLM6Z130125Q6D | 6      | 13 | 0,50 | 100,761 | 82,761  | 88,761  | 90,0 | 65,0 | 260,000 | D     |
| PHLM6Z150125Q6A | 6      | 15 | 0,00 | 105,493 | 95,493  | 95,493  | 90,0 | 65,0 | 300,000 | A     |
| PHLM6Z150125Q6D | 6      | 15 | 0,00 | 105,493 | 95,493  | 95,493  | 90,0 | 65,0 | 300,000 | D     |

Nota: La unión atornillada limita el par máximo transmisible. Consulte la tabla de la página 35.

## 2 Engranajes de precisión · KPH255 · Ø140



- » Calidad Q6
- » Tratamiento dentado Rectificado
- » Norma engranaje DIN867
- » Ángulo de hélice 19°31'42"



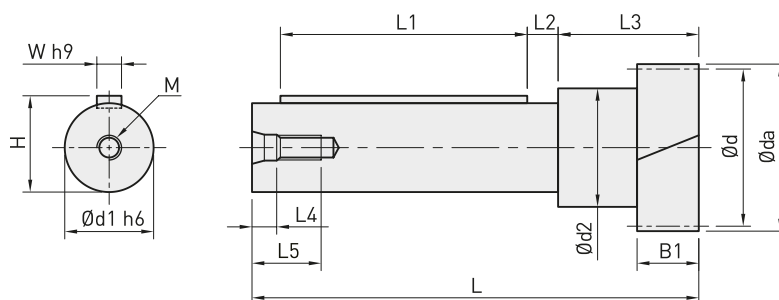
- » Ángulo de presión 20°
- » Material Placa: S45C sin tratamiento
- » Tratamiento térmico Engranaje: 20CrMnTi  
Cementado, HRC 55~60°

| Referencia      | Módulo | z  | X    | da      | d       | dw      | L    | L1   | nxd     | Forma |
|-----------------|--------|----|------|---------|---------|---------|------|------|---------|-------|
| PHLM4Z12Ø140Q6A | 4      | 12 | 0,50 | 62,930  | 50,930  | 54,930  | 79,0 | 45,0 | 160,000 | A     |
| PHLM4Z12Ø140Q6B | 4      | 12 | 0,50 | 62,930  | 50,930  | 54,930  | 79,0 | 45,0 | 160,000 | B     |
| PHLM4Z19Ø140Q6A | 4      | 19 | 0,11 | 89,519  | 80,639  | 81,519  | 79,0 | 45,0 | 253,334 | A     |
| PHLM4Z19Ø140Q6B | 4      | 19 | 0,11 | 89,519  | 80,639  | 81,519  | 79,0 | 45,0 | 253,334 | B     |
| PHLM4Z20Ø140Q6A | 4      | 20 | 0,00 | 92,883  | 84,883  | 84,883  | 79,0 | 45,0 | 266,667 | A     |
| PHLM4Z20Ø140Q6B | 4      | 20 | 0,00 | 92,883  | 84,883  | 84,883  | 79,0 | 45,0 | 266,667 | B     |
| PHLM5Z14Ø140Q6A | 5      | 14 | 0,30 | 87,272  | 74,272  | 77,272  | 89,0 | 55,0 | 233,334 | A     |
| PHLM5Z14Ø140Q6B | 5      | 14 | 0,30 | 87,272  | 74,272  | 77,272  | 89,0 | 55,0 | 233,334 | B     |
| PHLM5Z18Ø140Q6A | 5      | 18 | 0,00 | 105,493 | 95,493  | 95,493  | 89,0 | 55,0 | 300,000 | A     |
| PHLM5Z18Ø140Q6B | 5      | 18 | 0,00 | 105,493 | 95,493  | 95,493  | 89,0 | 55,0 | 300,000 | B     |
| PHLM5Z19Ø140Q6A | 5      | 19 | 0,00 | 110,798 | 100,798 | 100,798 | 89,0 | 55,0 | 316,667 | A     |
| PHLM5Z19Ø140Q6B | 5      | 19 | 0,00 | 110,798 | 100,798 | 100,798 | 89,0 | 55,0 | 316,667 | B     |
| PHLM6Z12Ø140Q6A | 6      | 12 | 0,50 | 94,394  | 76,394  | 82,394  | 99,0 | 65,0 | 240,000 | A     |
| PHLM6Z12Ø140Q6B | 6      | 12 | 0,50 | 94,394  | 76,394  | 82,394  | 99,0 | 65,0 | 240,000 | B     |
| PHLM6Z15Ø140Q6A | 6      | 15 | 0,00 | 107,493 | 95,493  | 95,493  | 99,0 | 65,0 | 300,000 | A     |
| PHLM6Z15Ø140Q6B | 6      | 15 | 0,00 | 107,493 | 95,493  | 95,493  | 99,0 | 65,0 | 300,000 | B     |
| PHLM6Z16Ø140Q6A | 6      | 16 | 0,00 | 113,859 | 101,859 | 101,859 | 99,0 | 65,0 | 320,000 | A     |
| PHLM6Z16Ø140Q6B | 6      | 16 | 0,00 | 113,859 | 101,859 | 101,859 | 99,0 | 65,0 | 320,000 | B     |

Nota: La unión atornillada limita el par máximo transmisible. Consulte la tabla de la página 35.



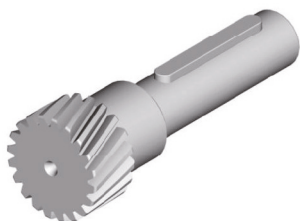
## 2 Ejecución · Piñón de eje largo con chavetero para eje hueco



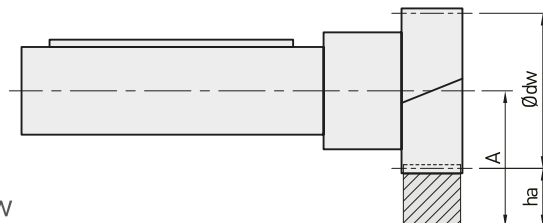
|                       |             |                       |                       |
|-----------------------|-------------|-----------------------|-----------------------|
| » Calidad             | Q5          | » Ángulo de hélice    | 19°31'42"             |
| » Tratamiento dentado | Rectificado | » Material            | 20CrMnTi              |
| » Norma engranaje     | DIN867      | » Tratamiento térmico | Cementado, HRC 55~60° |
| » Ángulo de presión   | 20°         |                       |                       |

| Referencia      | Mód. | z  | X     | da      | d       | dw      | d1h6 | d2 | B1 | L   | L1  | L2   | L3   | L4  | L5   | M   | Wh9 | H    | nxd     |
|-----------------|------|----|-------|---------|---------|---------|------|----|----|-----|-----|------|------|-----|------|-----|-----|------|---------|
| H20-015-20-DIN5 | 1,5  | 20 | 0,000 | 34,831  | 31,831  | 31,831  | 20   | 26 | 20 | 100 | 40  | 7,5  | 45   | 4,8 | 12,5 | M5  | 6   | 22,5 | 100,000 |
| H15-020-20-DIN5 | 2    | 15 | 0,417 | 37,500  | 31,831  | 33,500  | 20   | 24 | 25 | 105 | 28  | 13,5 | 50   | 4,8 | 12,5 | M5  | 6   | 22,5 | 100,000 |
| H20-020-25-DIN5 | 2    | 20 | 0,000 | 46,441  | 42,441  | 42,441  | 25   | 35 | 25 | 141 | 63  | 13,0 | 53   | 7,2 | 19   | M8  | 8   | 28   | 133,332 |
| H30-020-25-DIN5 | 2    | 30 | 0,000 | 67,662  | 63,662  | 63,662  | 25   | 38 | 25 | 141 | 63  | 13,0 | 53   | 7,2 | 19   | M8  | 8   | 28   | 200,000 |
| H30-020-28-DIN5 | 2    | 30 | 0,000 | 67,662  | 63,662  | 63,662  | 28   | 42 | 25 | 166 | 80  | 14,5 | 57,5 | 7,2 | 19   | M8  | 8   | 31   | 200,000 |
| H30-020-36-DIN5 | 2    | 30 | 0,000 | 67,662  | 63,662  | 63,662  | 36   | 48 | 25 | 181 | 100 | 12,5 | 57   | 10  | 28   | M12 | 10  | 39   | 200,000 |
| H20-030-25-DIN5 | 3    | 20 | 0,000 | 69,662  | 63,662  | 63,662  | 25   | 38 | 30 | 143 | 63  | 13,0 | 55   | 7,2 | 19   | M8  | 8   | 28   | 200,000 |
| H20-030-28-DIN5 | 3    | 20 | 0,000 | 69,662  | 63,662  | 63,662  | 28   | 42 | 30 | 168 | 80  | 14,5 | 60   | 7,2 | 19   | M8  | 8   | 31   | 200,000 |
| H20-030-36-DIN5 | 3    | 20 | 0,000 | 69,662  | 63,662  | 63,662  | 36   | 48 | 30 | 186 | 100 | 12,5 | 62   | 10  | 28   | M12 | 10  | 39   | 200,000 |
| H15-040-28-DIN5 | 4    | 15 | 0,000 | 71,662  | 63,662  | 63,662  | 28   | 42 | 40 | 173 | 80  | 14,5 | 65   | 7,2 | 19   | M8  | 8   | 31   | 200,000 |
| H15-040-36-DIN5 | 4    | 15 | 0,000 | 71,662  | 63,662  | 63,662  | 36   | 48 | 40 | 191 | 100 | 12,5 | 67   | 10  | 28   | M12 | 10  | 39   | 200,000 |
| H15-040-48-DIN5 | 4    | 15 | 0,000 | 71,662  | 63,662  | 63,662  | 48   | 57 | 40 | 216 | 125 | 9,0  | 72   | 10  | 28   | M12 | 14  | 51,5 | 200,000 |
| H30-040-48-DIN5 | 4    | 30 | 0,000 | 135,325 | 127,324 | 127,324 | 48   | 57 | 40 | 216 | 125 | 9,0  | 72   | 10  | 28   | M12 | 14  | 51,5 | 400,000 |
| H12-050-48-DIN5 | 5    | 12 | 0,434 | 78,002  | 63,662  | 68,000  | 48   | 57 | 50 | 226 | 125 | 9,0  | 82   | 10  | 28   | M12 | 14  | 51,5 | 200,000 |
| H15-050-60-DIN5 | 5    | 15 | 0,500 | 94,578  | 79,578  | 84,578  | 60   | 68 | 50 | 272 | 150 | 10,0 | 90   | 12  | 36   | M16 | 18  | 64   | 250,000 |
| H13-060-60-DIN5 | 6    | 13 | 0,500 | 100,761 | 82,761  | 88,761  | 60   | 70 | 60 | 282 | 150 | 10,0 | 100  | 12  | 36   | M16 | 18  | 64   | 260,000 |

## 2 Ejecución · Piñón de eje largo con chavetero para eje hueco



$$A = h_a + \frac{\varnothing dw}{2}$$



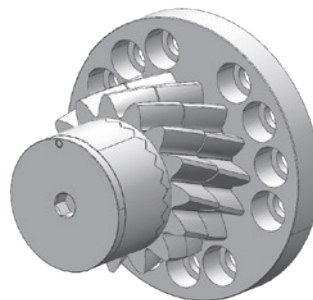
### 3.1 Engranajes customizados · No estándar

- Además de las especificaciones estándar incluidas en el catálogo, podemos **fabricar según los planos proporcionados** por el cliente.



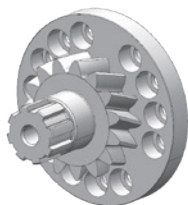
## 3.2 Engranajes dobles precargados

- » El engranaje doble precargado permite una transmisión sin juego en combinación con una cremallera. Una brida conforme a ISO 9409-1 conecta el engranaje doble precargado con el reductor.
- » El engranaje doble precargado está disponible tanto en versión de dientes rectos como helicoidales.



### Instrucciones de montaje para engranajes dobles precargados con dentado recto y helicoidal

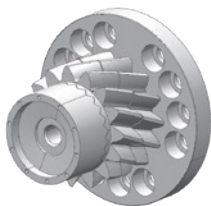
**1** Montar el conjunto en el reductor.



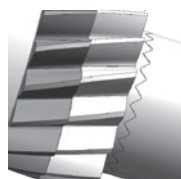
**2** Fijar el engranaje precargado en el eje.



**3** Colocar la placa de presión con acoplamiento Hirth.



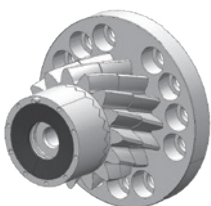
**4** Seleccionar la orientación angular correcta.



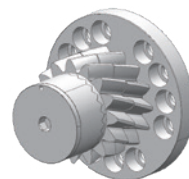
Ligero desplazamiento en este lado

Contacto en este lado

**5** Instalar los muelles de disco.



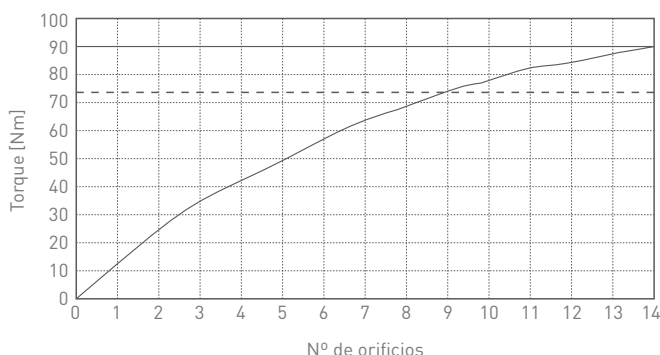
**6** Insertar el tornillo de presión y aplicar precarga hasta eliminar la holgura.



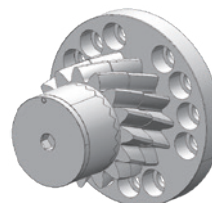
Girar el tornillo de presión hasta que no se perciba holgura en el eje.

**7** Consultar el diagrama y ajustar el número de orificios roscados según se indique.

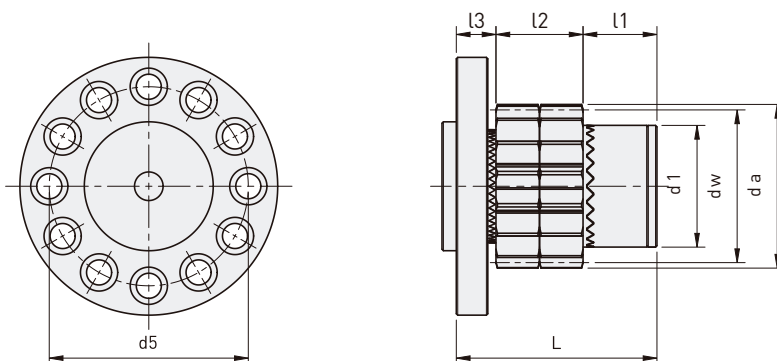
Ajuste del sistema de precarga [m=3, z=14 helicoidal]



**8** Insertar el tornillo de bloqueo.



## 3.2 Engranajes dobles precargados



|                       |             |                       |            |
|-----------------------|-------------|-----------------------|------------|
| » Módulo              | 3-8         | » Ángulo de presión   | 20°        |
| » Calidad             | DIN6e25     | » Ángulo de hélice    | 19°31'42"  |
| » Tratamiento dentado | Rectificado | » Material            | 20CrMnTi   |
| » Norma engranaje     | ISO53       | » Tratamiento térmico | Endurecido |

| Referencia DEVOTEC | Dentado    | Módulo | Nº. dientes | B         | X     | d1 | dw  | da  | d5  | L   | I1   | I2 | I3   |
|--------------------|------------|--------|-------------|-----------|-------|----|-----|-----|-----|-----|------|----|------|
| PRM3Z15063Q6DP     | Recto      | 3      | 15          | 0°        | 0,167 | 36 | 46  | 52  | 63  | 68  | 23   | 30 | 15   |
| PRM4Z14080Q6DP     |            | 4      | 14          | 0°        | 0,250 | 45 | 58  | 66  | 80  | 96  | 38   | 40 | 18   |
| PRM5Z150125Q6DP    |            | 5      | 15          | 0°        | 0,500 | 65 | 80  | 90  | 125 | 113 | 38   | 50 | 25   |
| PRM6Z160140Q6DP    |            | 6      | 16          | 0°        | 0,500 | 85 | 102 | 114 | 140 | 143 | 55   | 60 | 28   |
| PRM8Z140160Q6DP    |            | 8      | 14          | 0°        | 0,118 | 90 | 114 | 130 | 160 | 173 | 60.5 | 80 | 32.5 |
| PHRM3Z14063Q6DP    | Helicoidal | 3      | 14          | 19°31'42" | 0,239 | 36 | 46  | 52  | 63  | 68  | 23   | 30 | 15   |
| PHRM4Z13080Q6DP    |            | 4      | 13          | 19°31'42" | 0,353 | 45 | 58  | 66  | 80  | 96  | 38   | 40 | 18   |
| PHRM5Z140125Q6DP   |            | 5      | 14          | 19°31'42" | 0,573 | 65 | 80  | 90  | 125 | 113 | 38   | 50 | 25   |
| PHRM6Z150140Q6DP   |            | 6      | 15          | 19°31'42" | 0,542 | 85 | 102 | 114 | 140 | 143 | 55   | 60 | 28   |
| PHRM8Z130160Q6DP   |            | 8      | 13          | 19°31'42" | 0,228 | 90 | 114 | 130 | 160 | 173 | 60.5 | 80 | 32.5 |

### Modificación de la altura del diente

#### Tablas de carga

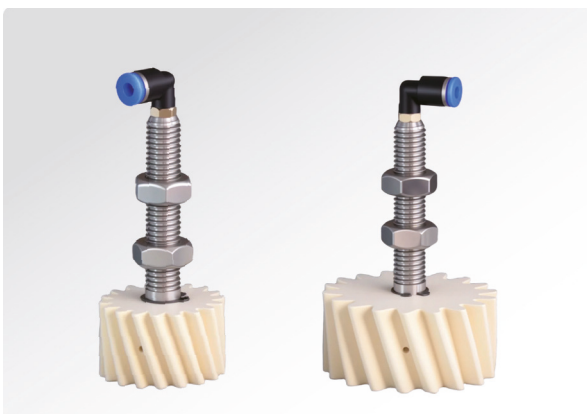
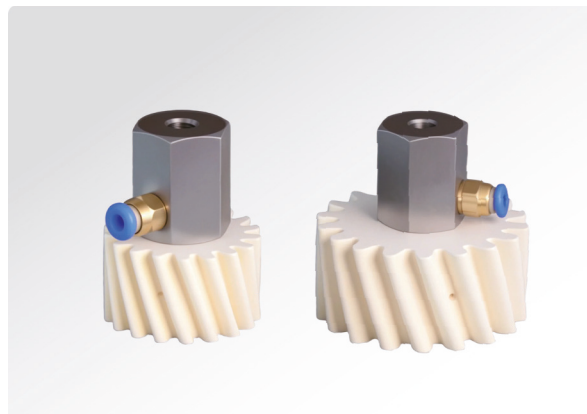
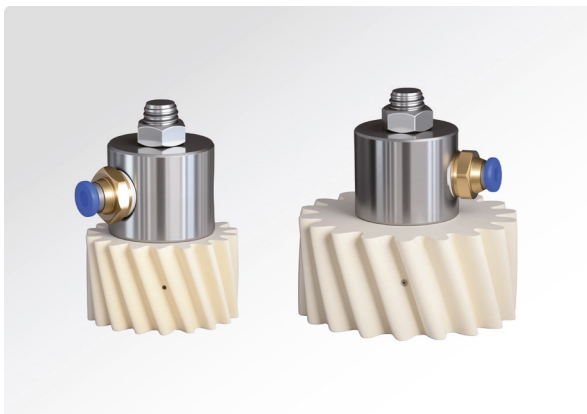
» Valores determinados bajo las siguientes condiciones:

Velocidad 2.5m/s · KA 1,25; 20.000h · Grasa

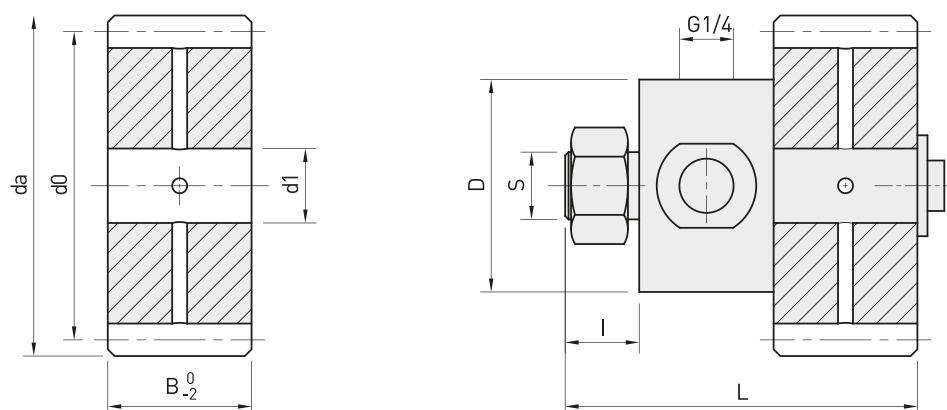
| Referencia brida DEVOTEC | Dentado.   | Dentado | Nº. dientes | X     | Par máximo Nm |                   | Velocidad [r.p.m] |
|--------------------------|------------|---------|-------------|-------|---------------|-------------------|-------------------|
|                          |            |         |             |       | sin precarga  | con precarga máx. |                   |
| ISO 9409-1-63            | Recto      | 3       | 15          | 0,167 | 109           | 55                | 1061              |
| ISO 9409-1-80            |            | 4       | 14          | 0,250 | 237           | 119               | 853               |
| ISO 9409-1-125           |            | 5       | 15          | 0,500 | 623           | 312               | 637               |
| ISO 9409-1-140           |            | 6       | 16          | 0,500 | 1199          | 600               | 497               |
| ISO 9409-1-160           |            | 8       | 14          | 0,118 | 1847          | 924               | 426               |
| ISO 9409-1-63            | Helicoidal | 3       | 14          | 0,239 | 147           | 74                | 1071              |
| ISO 9409-1-80            |            | 4       | 13          | 0,353 | 305           | 153               | 865               |
| ISO 9409-1-125           |            | 5       | 14          | 0,573 | 594           | 297               | 643               |
| ISO 9409-1-140           |            | 6       | 15          | 0,542 | 1125          | 563               | 500               |
| ISO 9409-1-160           |            | 8       | 13          | 0,228 | 1911          | 956               | 433               |

### 3.3 Engranajes de fieltro

- El engranaje de fieltro es un tipo de engranaje lubricado fabricado en material de fieltro, que se utiliza con frecuencia en sistemas de lubricación automática. Engrana con otro engranaje o cremallera, añadiendo grasa de manera regular y controlada para mantener la calidad de la lubricación en la zona de contacto.



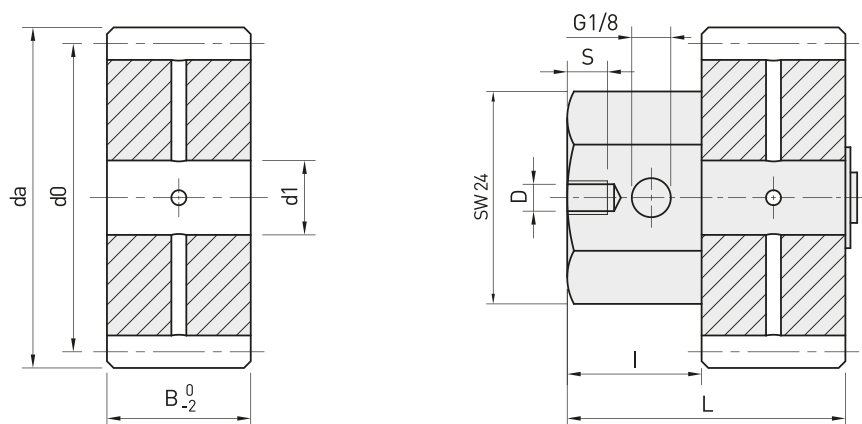
### 3.3 Engranajes de fieltro · Eje de montaje A



| Referencia DEVOTEC | Engranajes de fieltro |    |      |       |       |    |     | Eje de montaje |     |    |     |
|--------------------|-----------------------|----|------|-------|-------|----|-----|----------------|-----|----|-----|
|                    | Módulo                | Z  | \\ / | da    | d0    | d1 | B   | D              | S   | I  | L   |
| FA26S-015          | 1,5                   | 26 | S    | 42    | 38,6  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA25L-015          | 1,5                   | 25 | L    | 42    | 38,6  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA25R-015          | 1,5                   | 25 | R    | 42    | 38,6  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA19S-020          | 2                     | 19 | S    | 42    | 37,5  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA18L-020          | 2                     | 18 | L    | 42    | 37,5  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA18R-020          | 2                     | 18 | R    | 42    | 37,5  | 12 | 25  | 30             | M10 | 10 | 62  |
| FA19S-030          | 3                     | 19 | S    | 63    | 57,0  | 12 | 30  | 30             | M10 | 10 | 67  |
| FA18L-030          | 3                     | 18 | L    | 63    | 57,3  | 12 | 30  | 30             | M10 | 10 | 67  |
| FA18R-030          | 3                     | 18 | R    | 63    | 57,3  | 12 | 30  | 30             | M10 | 10 | 67  |
| FA19S-040          | 4                     | 19 | S    | 84    | 76,0  | 12 | 40  | 30             | M10 | 10 | 77  |
| FA18L-040          | 4                     | 18 | L    | 84,4  | 76,4  | 12 | 40  | 30             | M10 | 10 | 77  |
| FA18R-040          | 4                     | 18 | R    | 84,4  | 76,4  | 12 | 40  | 30             | M10 | 10 | 77  |
| FA18S-050          | 5                     | 18 | S    | 100   | 90,0  | 20 | 50  | 50             | M12 | 15 | 90  |
| FA17L-050          | 5                     | 17 | L    | 100,2 | 90,2  | 20 | 50  | 50             | M12 | 15 | 90  |
| FA17R-050          | 5                     | 17 | R    | 100,2 | 90,2  | 20 | 50  | 50             | M12 | 15 | 90  |
| FA18S-060          | 6                     | 18 | S    | 120   | 108,0 | 20 | 60  | 50             | M12 | 15 | 100 |
| FA17L-060          | 6                     | 17 | L    | 120,2 | 108,2 | 20 | 60  | 50             | M12 | 15 | 100 |
| FA17R-060          | 6                     | 17 | R    | 120,2 | 108,2 | 20 | 60  | 50             | M12 | 15 | 100 |
| FA18S-080          | 8                     | 18 | S    | 160   | 144,0 | 20 | 80  | 50             | M12 | 15 | 120 |
| FA17L-080          | 8                     | 17 | L    | 160   | 144,3 | 20 | 80  | 50             | M12 | 15 | 120 |
| FA17R-080          | 8                     | 17 | R    | 160   | 144,3 | 20 | 80  | 50             | M12 | 15 | 120 |
| FA18S-100          | 10                    | 18 | S    | 200   | 180,0 | 25 | 100 | 50             | M12 | 15 | 140 |
| FA17L-100          | 10                    | 17 | L    | 200   | 180,4 | 25 | 100 | 50             | M12 | 15 | 140 |
| FA17R-100          | 10                    | 17 | R    | 200   | 180,4 | 25 | 100 | 50             | M12 | 15 | 140 |

Nota: Incluye racor de lubricación G1/4.

### 3.3 Engranajes de fieltro · Eje de montaje B

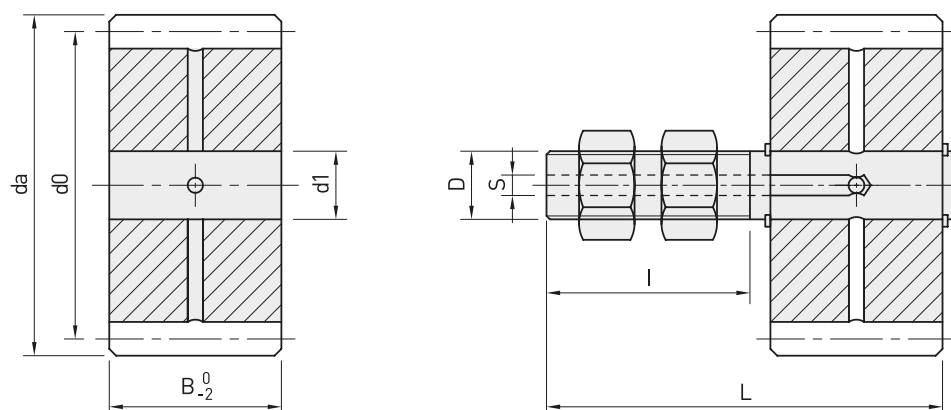


| Referencia DEVOTEC | Engranajes de fieltro |    |       |        |        |    |    | Eje de montaje |    |    |    |
|--------------------|-----------------------|----|-------|--------|--------|----|----|----------------|----|----|----|
|                    | Módulo                | Z  | \ I / | da     | d0     | d1 | B  | D              | S  | I  | L  |
| FB26S-015          | 1,5                   | 26 | S     | 42,00  | 38,60  | 12 | 20 | M8             | 10 | 30 | 50 |
| FB25L-015          | 1,5                   | 25 | L     | 42,00  | 38,60  | 12 | 20 | M8             | 10 | 30 | 50 |
| FB25R-015          | 1,5                   | 25 | R     | 42,00  | 38,60  | 12 | 20 | M8             | 10 | 30 | 50 |
| FB19S-020          | 2                     | 19 | S     | 42,00  | 38,00  | 12 | 25 | M8             | 10 | 30 | 55 |
| FB18L-020          | 2                     | 18 | L     | 42,00  | 38,19  | 12 | 25 | M8             | 10 | 30 | 55 |
| FB18R-020          | 2                     | 18 | R     | 42,00  | 38,19  | 12 | 25 | M8             | 10 | 30 | 55 |
| FB19S-030          | 3                     | 19 | S     | 63,00  | 57,00  | 12 | 30 | M8             | 10 | 30 | 60 |
| FB18L-030          | 3                     | 18 | L     | 63,00  | 57,29  | 12 | 30 | M8             | 10 | 30 | 60 |
| FB18R-030          | 3                     | 18 | R     | 63,00  | 57,29  | 12 | 30 | M8             | 10 | 30 | 60 |
| FB19S-040          | 4                     | 19 | S     | 84,00  | 76,00  | 12 | 40 | M8             | 10 | 30 | 70 |
| FB18L-040          | 4                     | 18 | L     | 84,00  | 76,39  | 12 | 40 | M8             | 10 | 30 | 70 |
| FB18R-040          | 4                     | 18 | R     | 84,00  | 76,39  | 12 | 40 | M8             | 10 | 30 | 70 |
| FB19S-050          | 5                     | 19 | S     | 105,00 | 95,00  | 20 | 50 | M8             | 10 | 30 | 80 |
| FB18L-050          | 5                     | 18 | L     | 105,00 | 95,49  | 20 | 50 | M8             | 10 | 30 | 80 |
| FB18R-050          | 5                     | 18 | R     | 105,00 | 95,49  | 20 | 50 | M8             | 10 | 30 | 80 |
| FB19S-060          | 6                     | 19 | S     | 126,00 | 114,00 | 20 | 60 | M8             | 10 | 30 | 90 |
| FB18L-060          | 6                     | 18 | L     | 126,00 | 114,59 | 20 | 60 | M8             | 10 | 30 | 90 |
| FB18R-060          | 6                     | 18 | R     | 126,00 | 114,59 | 20 | 60 | M8             | 10 | 30 | 90 |

Nota: Incluye racor de lubricación G1/8.



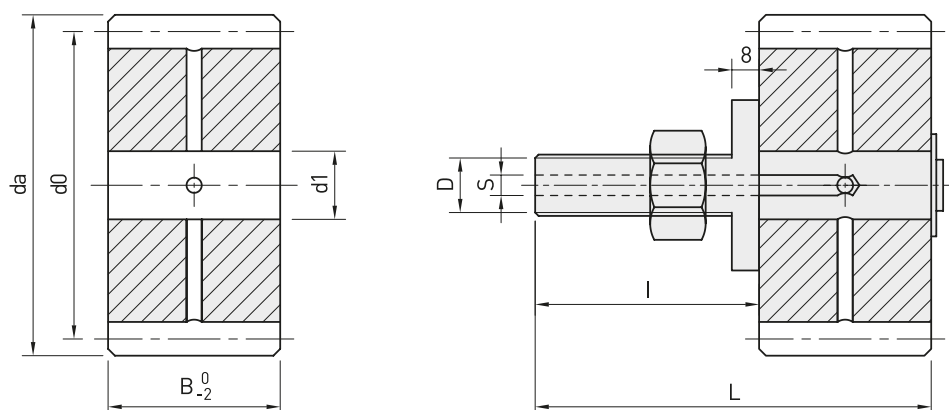
### 3.3 Engranajes de fieltro · Eje de montaje C



| Referencia DEVOTEC | Engranajes de fieltro |    |      |        |        |    |    | Eje de montaje |      |      |     |
|--------------------|-----------------------|----|------|--------|--------|----|----|----------------|------|------|-----|
|                    | Módulo                | Z  | \\ / | da     | d0     | d1 | B  | D              | S    | I    | L   |
| FC26S-015          | 1,5                   | 26 | S    | 42,00  | 38,60  | 12 | 20 | M12            | M6X1 | 37,5 | 62  |
| FC25L-015          | 1,5                   | 25 | L    | 42,00  | 38,60  | 12 | 20 | M12            | M6X1 | 37,5 | 62  |
| FC25R-015          | 1,5                   | 25 | R    | 42,00  | 38,60  | 12 | 20 | M12            | M6X1 | 37,5 | 62  |
| FC19S-020          | 2                     | 19 | S    | 42,00  | 37,50  | 12 | 25 | M12            | M6X1 | 37,5 | 67  |
| FC18L-020          | 2                     | 18 | L    | 42,00  | 37,50  | 12 | 25 | M12            | M6X1 | 37,5 | 67  |
| FC18R-020          | 2                     | 18 | R    | 42,00  | 37,50  | 12 | 25 | M12            | M6X1 | 37,5 | 67  |
| FC19S-030          | 3                     | 19 | S    | 63,00  | 56,20  | 12 | 30 | M12            | M6X1 | 45,0 | 80  |
| FC18L-030          | 3                     | 18 | L    | 63,00  | 56,20  | 12 | 30 | M12            | M6X1 | 45,0 | 80  |
| FC18R-030          | 3                     | 18 | R    | 63,00  | 56,20  | 12 | 30 | M12            | M6X1 | 45,0 | 80  |
| FC19S-040          | 4                     | 19 | S    | 84,00  | 75,00  | 12 | 40 | M12            | M6X1 | 45,0 | 90  |
| FC18L-040          | 4                     | 18 | L    | 84,00  | 75,00  | 12 | 40 | M12            | M6X1 | 45,0 | 90  |
| FC18R-040          | 4                     | 18 | R    | 84,00  | 75,00  | 12 | 40 | M12            | M6X1 | 45,0 | 90  |
| FC19S-050          | 5                     | 19 | S    | 105,00 | 95,00  | 12 | 50 | M12            | M6X1 | 52,5 | 105 |
| FC18L-050          | 5                     | 18 | L    | 105,00 | 95,49  | 12 | 50 | M12            | M6X1 | 52,5 | 105 |
| FC18R-050          | 5                     | 18 | R    | 105,00 | 95,49  | 12 | 50 | M12            | M6X1 | 52,5 | 105 |
| FC19S-060          | 6                     | 19 | S    | 126,00 | 114,00 | 20 | 60 | M20            | G1/8 | 52,5 | 140 |
| FC18L-060          | 6                     | 18 | L    | 126,00 | 114,59 | 20 | 60 | M20            | G1/8 | 52,5 | 140 |
| FC18R-060          | 6                     | 18 | R    | 126,00 | 114,59 | 20 | 60 | M20            | G1/8 | 52,5 | 140 |

Nota: Para la dimensión S se incluye racor de lubricación; para la dimensión D se incluyen 2 tuercas de acero inoxidable. Para otras longitudes, consulte a GAES.

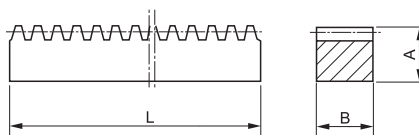
### 3.3 Engranajes de fieltro · Eje de montaje D



| Referencia DEVOTEC | Engranajes de fieltro |    |       |        |        |    |     | Eje de montaje |      |    |      |
|--------------------|-----------------------|----|-------|--------|--------|----|-----|----------------|------|----|------|
|                    | Módulo                | Z  | \ / \ | da     | d0     | d1 | B   | D              | S    | I  | L    |
| FD26S-015          | 1,5                   | 26 | S     | 42,00  | 38,60  | 12 | 25  | M12            | M6X1 | 28 | 53   |
| FD25L-015          | 1,5                   | 25 | L     | 42,00  | 38,60  | 12 | 25  | M12            | M6X1 | 28 | 53   |
| FD25R-015          | 1,5                   | 25 | R     | 42,00  | 38,60  | 12 | 25  | M12            | M6X1 | 28 | 53   |
| FD19S-020          | 2                     | 19 | S     | 42,00  | 38,00  | 12 | 25  | M12            | M6X1 | 28 | 52   |
| FD18L-020          | 2                     | 18 | L     | 42,00  | 38,19  | 12 | 25  | M12            | M6X1 | 28 | 52   |
| FD18R-020          | 2                     | 18 | R     | 42,00  | 38,19  | 12 | 25  | M12            | M6X1 | 28 | 52   |
| FD19S-030          | 3                     | 19 | S     | 63,00  | 57,00  | 12 | 30  | M12            | M6X1 | 28 | 57   |
| FD18L-030          | 3                     | 18 | L     | 63,00  | 57,29  | 12 | 30  | M12            | M6X1 | 28 | 57   |
| FD18R-030          | 3                     | 18 | R     | 63,00  | 57,29  | 12 | 30  | M12            | M6X1 | 28 | 57   |
| FD19S-040          | 4                     | 19 | S     | 84,00  | 76,00  | 12 | 40  | M12            | M6X1 | 28 | 67   |
| FD18L-040          | 4                     | 18 | L     | 84,00  | 76,39  | 12 | 40  | M12            | M6X1 | 28 | 67   |
| FD18R-040          | 4                     | 18 | R     | 84,00  | 76,39  | 12 | 40  | M12            | M6X1 | 28 | 67   |
| FD19S-050          | 5                     | 19 | S     | 105,00 | 95,00  | 20 | 50  | M16            | M6X1 | 33 | 83,5 |
| FD18L-050          | 5                     | 18 | L     | 105,00 | 95,49  | 20 | 50  | M16            | M6X1 | 33 | 83,5 |
| FD18R-050          | 5                     | 18 | R     | 105,00 | 95,49  | 20 | 50  | M16            | M6X1 | 33 | 83,5 |
| FD19S-060          | 6                     | 19 | S     | 126,00 | 114,00 | 20 | 60  | M16            | M6X1 | 33 | 93,5 |
| FD18L-060          | 6                     | 18 | L     | 126,00 | 114,59 | 20 | 60  | M16            | M6X1 | 33 | 93,5 |
| FD18R-060          | 6                     | 18 | R     | 126,00 | 114,59 | 20 | 60  | M16            | M6X1 | 33 | 93,5 |
| FD18S-080          | 8                     | 18 | S     | 160,00 | 144,00 | 20 | 80  | M16            | M6X1 | 33 | 113  |
| FD17L-080          | 8                     | 17 | L     | 160,00 | 144,29 | 20 | 80  | M16            | M6X1 | 33 | 113  |
| FD17R-080          | 8                     | 17 | R     | 160,00 | 144,29 | 20 | 80  | M16            | M6X1 | 33 | 113  |
| FD18S-100          | 10                    | 18 | S     | 200,00 | 180,00 | 25 | 100 | M16            | M6X1 | 33 | 133  |
| FD17L-100          | 10                    | 17 | L     | 200,00 | 180,39 | 25 | 100 | M16            | M6X1 | 33 | 133  |
| FD17R-100          | 10                    | 17 | R     | 200,00 | 180,39 | 25 | 100 | M16            | M6X1 | 33 | 133  |

Nota: Para la dimensión S se incluye racor de lubricación; para la dimensión D se incluye una tuerca de acero inoxidable.

## 4.1 Cremallera estándar · CRM

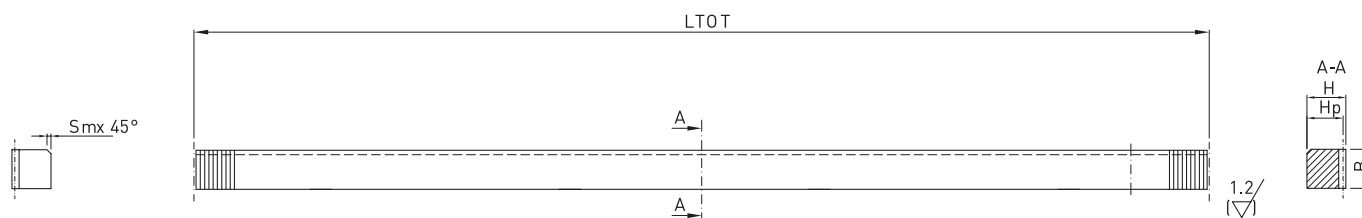


- » **Dentado** Recto
- » **Ángulo de presión** 20°
- » **Material** C 43

| Referencia   | Módulo | L       |         |         |
|--------------|--------|---------|---------|---------|
|              |        | 500     | 1000    | 2000    |
|              |        | A x B   | A x B   | A x B   |
| CRM1         | 1      | 15 x 15 | 15 x 15 | 15 x 15 |
| CRM1,5       | 1,5    | 17 x 17 | 17 x 17 | 17 x 17 |
| CRM2         | 2      | 20 x 20 | 20 x 20 | 20 x 20 |
| CRM2,5       | 2,5    | 25 x 25 | 25 x 25 | 25 x 25 |
| CRM3         | 3      | 30 x 30 | 30 x 30 | 30 x 30 |
| CRM4 (25x25) | 4      | –       | 25 x 25 | 25 x 25 |
| CRM4 (30x30) | 4      | –       | 30 x 30 | 30 x 30 |
| CRM4 (40x40) | 4      | 40 x 40 | 40 x 40 | 40 x 40 |
| CRM5         | 5      | 50 x 50 | 50 x 50 | 50 x 50 |
| CRM6         | 6      | –       | 60 x 60 | 60 x 60 |

Nota: Cremalleras en inoxidable disponibles bajo pedido. M7-M12 y M1-M12 disponibles bajo pedido.

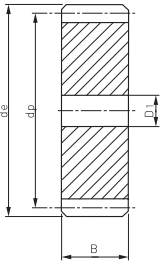
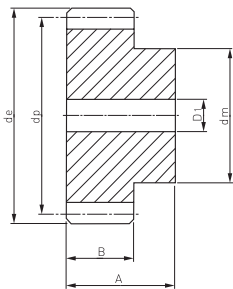
## 4.2 Cremallera de plástico



- » **Dentado** Recto
- » **Ángulo de presión** 20°
- » **Material** POM

| Referencia     | Módulo | L TOT    | B  | H  | Hp     | Z   |
|----------------|--------|----------|----|----|--------|-----|
| CRM1P/500      | 1      | 502.655  | 15 | 15 | 14     | 160 |
| CRM1P/1000     | 1      | 1005.310 | 15 | 15 | 14     | 320 |
| CRM1.5P/500    | 1.5    | 499.513  | 17 | 17 | 15.5   | 106 |
| CRM1.5P/1000   | 1.5    | 999.026  | 17 | 17 | 15.5   | 212 |
| CRM1.75P/500   | 1.75   | 500.299  | 20 | 20 | 18.25  | 91  |
| CRM1.75P/1000  | 1.75   | 1000.597 | 20 | 20 | 18.25  | 182 |
| CRM2P/500      | 2      | 502.655  | 20 | 20 | 18     | 80  |
| CRM2P/1000     | 2      | 1005.310 | 20 | 20 | 18     | 160 |
| CRM2.5P/500    | 2.5    | 502.655  | 25 | 25 | 22.5   | 64  |
| CRM2.5P/1000   | 2.5    | 997.456  | 25 | 25 | 22.5   | 127 |
| CRM3P/500      | 3      | 508.938  | 30 | 30 | 27     | 54  |
| CRM3P/1000     | 3      | 1017.876 | 30 | 30 | 27     | 108 |
| CRM3.183P/500  | 3.183  | 500.000  | 30 | 30 | 26.817 | 50  |
| CRM3.183P/1000 | 3.183  | 1000.000 | 30 | 30 | 26.817 | 100 |
| CRM4P/500      | 4      | 502.655  | 40 | 40 | 36     | 40  |
| CRM4P/1000     | 4      | 1005.310 | 40 | 40 | 36     | 80  |

5 Engranajes estándar



- » Dentado
- » Ángulo de presión
- » Material

Recto  
20°  
C43

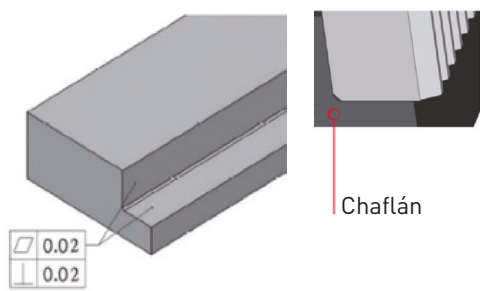
|            | "B" para | "A" para |
|------------|----------|----------|
| Módulo 1   | = 15 mm  | = 25 mm  |
| Módulo 1,5 | = 17 mm  | = 30 mm  |
| Módulo 2   | = 20 mm  | = 35 mm  |
| Módulo 2,5 | = 25 mm  | = 45 mm  |
| Módulo 3   | = 30 mm  | = 50 mm  |
| Módulo 4   | = 40 mm  | = 60 mm  |
| Módulo 5   | = 50 mm  | = 75 mm  |
| Módulo 6   | = 50 mm  | = 75 mm  |

| Z  | Módulo 1 |    |    |    | Módulo 1,5 |      |    |    | Módulo 2 |    |    |    | Módulo 2,5 |      |    |    | Módulo 3 |    |    |    | Módulo 4 |     |    |    | Módulo 5 |     |     |    | Módulo 6 |     |     |    |
|----|----------|----|----|----|------------|------|----|----|----------|----|----|----|------------|------|----|----|----------|----|----|----|----------|-----|----|----|----------|-----|-----|----|----------|-----|-----|----|
|    | de       | dp | dm | D1 | de         | dp   | dm | D1 | de       | dp | dm | D1 | de         | dp   | dm | D1 | de       | dp | dm | D1 | de       | dp  | dm | D1 | de       | dp  | dm  | D1 | de       | dp  | dm  | D1 |
| 12 | 14       | 12 | 9  | -  | 21.0       | 18.0 | 14 | 8  | 28       | 24 | 18 | 10 | 35.0       | 30.0 | 22 | 10 | 42       | 36 | 27 | 12 | 56       | 48  | 35 | 14 | 70       | 60  | 45  | 20 | 84       | 72  | 54  | 20 |
| 13 | 15       | 13 | 10 | -  | 22.5       | 19.5 | 15 | 8  | 30       | 26 | 20 | 10 | 37.5       | 32.5 | 25 | 10 | 45       | 39 | 30 | 12 | 60       | 52  | 40 | 14 | 75       | 65  | 50  | 20 | 90       | 78  | 60  | 20 |
| 14 | 16       | 14 | 11 | -  | 24.0       | 21.0 | 17 | 8  | 32       | 28 | 22 | 10 | 40.0       | 35.0 | 28 | 10 | 48       | 42 | 33 | 12 | 64       | 56  | 45 | 14 | 80       | 70  | 55  | 20 | -        | -   | -   | -  |
| 15 | 17       | 15 | 12 | -  | 25.5       | 22.5 | 18 | 8  | 34       | 30 | 24 | 10 | 42.5       | 37.5 | 30 | 10 | 51       | 45 | 35 | 12 | 68       | 60  | 45 | 14 | 85       | 75  | 60  | 20 | 102      | 90  | 70  | 20 |
| 16 | 18       | 16 | 13 | -  | 27.0       | 24.0 | 19 | 8  | 36       | 32 | 25 | 10 | 45.0       | 40.0 | 32 | 12 | 54       | 48 | 38 | 14 | 72       | 64  | 50 | 16 | 90       | 80  | 65  | 20 | 108      | 95  | 75  | 20 |
| 17 | 19       | 17 | 14 | -  | 28.5       | 25.5 | 20 | 8  | 38       | 34 | 25 | 10 | 47.5       | 42.5 | 35 | 12 | 57       | 51 | 42 | 14 | 76       | 68  | 50 | 16 | 95       | 85  | 70  | 20 | -        | -   | -   | -  |
| 18 | 20       | 18 | 15 | 8  | 30.0       | 27.0 | 20 | 8  | 40       | 36 | 25 | 10 | 50.0       | 45.0 | 35 | 12 | 60       | 54 | 45 | 14 | 80       | 72  | 50 | 16 | 100      | 90  | 70  | 20 | 120      | 108 | 80  | 20 |
| 19 | 21       | 19 | 15 | 8  | 31.5       | 28.5 | 20 | 8  | 42       | 38 | 25 | 10 | 52.5       | 47.5 | 35 | 12 | 63       | 57 | 45 | 14 | 84       | 76  | 60 | 16 | 105      | 95  | 70  | 20 | -        | -   | -   | -  |
| 20 | 22       | 20 | 16 | 8  | 33.0       | 30.0 | 25 | 8  | 44       | 40 | 30 | 10 | 55.0       | 50.0 | 40 | 12 | 66       | 60 | 45 | 14 | 88       | 80  | 60 | 16 | 110      | 100 | 80  | 20 | 132      | 120 | 90  | 20 |
| 21 | 23       | 21 | 16 | 8  | 34.5       | 31.5 | 25 | 10 | 46       | 42 | 30 | 12 | 57.5       | 52.5 | 40 | 14 | 69       | 63 | 45 | 16 | 92       | 84  | 70 | 16 | 115      | 105 | 80  | 20 | -        | -   | -   | -  |
| 22 | 24       | 22 | 16 | 8  | 36.0       | 33.0 | 25 | 10 | 48       | 44 | 30 | 12 | 60.0       | 55.0 | 45 | 14 | 72       | 66 | 50 | 16 | 96       | 88  | 70 | 16 | 120      | 110 | 80  | 20 | -        | -   | -   | -  |
| 23 | 25       | 23 | 18 | 8  | 37.5       | 34.5 | 25 | 10 | 50       | 46 | 30 | 12 | 62.5       | 57.5 | 45 | 14 | 75       | 69 | 50 | 16 | 100      | 92  | 75 | 20 | 125      | 115 | 90  | 20 | -        | -   | -   | -  |
| 24 | 26       | 24 | 20 | 10 | 39.0       | 36.0 | 25 | 10 | 52       | 48 | 35 | 12 | 65.0       | 60.0 | 45 | 14 | 78       | 72 | 50 | 16 | 104      | 96  | 75 | 20 | 130      | 120 | 90  | 20 | 156      | 144 | 110 | 25 |
| 25 | 27       | 25 | 20 | 10 | 40.5       | 37.5 | 25 | 10 | 54       | 50 | 35 | 12 | 67.5       | 62.5 | 50 | 14 | 81       | 75 | 60 | 16 | 108      | 100 | 75 | 20 | 135      | 125 | 90  | 20 | 162      | 150 | 110 | 25 |
| 26 | 28       | 26 | 20 | 10 | 42.0       | 39.0 | 30 | 12 | 56       | 52 | 40 | 12 | 70.0       | 65.0 | 50 | 14 | 84       | 78 | 60 | 16 | 112      | 104 | 75 | 20 | 140      | 130 | 100 | 20 | -        | -   | -   | -  |
| 27 | 29       | 27 | 20 | 10 | 43.5       | 40.5 | 30 | 12 | 58       | 54 | 40 | 12 | 72.5       | 67.5 | 50 | 14 | 87       | 81 | 60 | 16 | 116      | 108 | 75 |    |          |     |     |    |          |     |     |    |

6 Instrucciones para el montaje de la cremallera

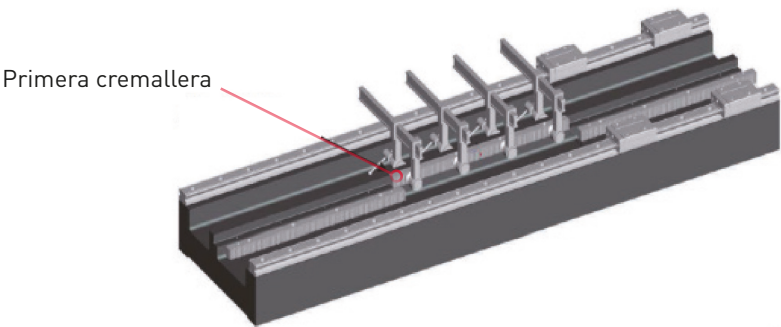
- 1 Antes de instalar las cremalleras, verifique que las tolerancias de la superficie de montaje y de la superficie de apoyo cumplen los requisitos de diseño; la perpendicularidad y la planitud de la bancada de la máquina deben ser  $\leq 0,02$  mm. Asimismo, limpie a fondo las superficies de montaje y de apoyo.
- Además, las cremalleras están chaflanadas para evitar interferencias durante el montaje, por lo que también deben preverse radios en las aristas de la superficie de contacto de la bancada.

Consulte la tabla siguiente para los chaflanes de cada módulo de cremallera



| Módulo   | Chaflán             |
|----------|---------------------|
| $\leq 3$ | $2 \times 45^\circ$ |
| $\geq 4$ | $3 \times 45^\circ$ |

- 2 Las cremalleras deben instalarse desde el centro de la bancada de la máquina hacia ambos lados. Por ejemplo, si se instalan 10 tramos de cremallera, se recomienda comenzar por el nº 5 o 6 y continuar hacia los extremos. Asegúrese de que los orificios de los tornillos y los pernos mantengan la misma alineación para evitar interferencias durante el montaje.

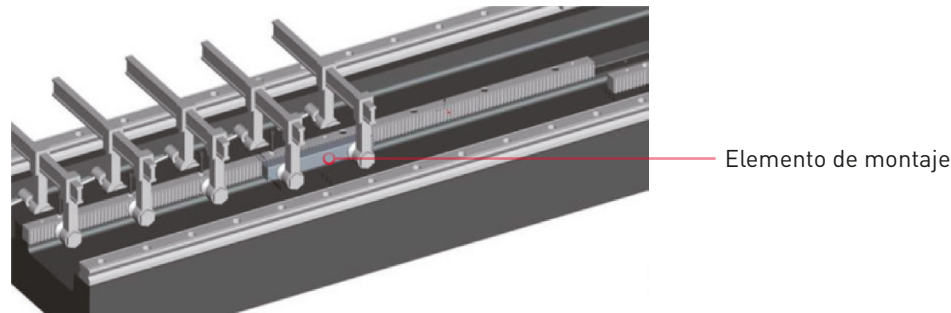


- 3 Al instalar la primera cremallera, los útiles de fijación deben distribuirse uniformemente cerca de los orificios de los tornillos, garantizando que la cremallera quede completamente apoyada sobre la superficie de apoyo. A continuación, apriete los tornillos con el par indicado en la tabla inferior, comenzando por el centro y avanzando hacia los extremos.

| Tornillos      | M6 | M8 | M10 | M12 | M16 | M20 | M30  | M36  |
|----------------|----|----|-----|-----|-----|-----|------|------|
| Par de apriete | 16 | 40 | 80  | 140 | 340 | 660 | 2300 | 4100 |

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- 4 Al instalar la segunda cremallera, realice un preapriete de los tornillos al 10% del par de apriete, de modo que aún sea posible el ajuste. Coloque la pieza de montaje sobre la unión para engranar los dientes de ambas cremalleras y apriete tras comprobar la tolerancia de la separación entre ellas.



Nota: La holgura de unión puede determinarse ajustando la separación entre cremalleras mediante 3 pasadores de medición y un reloj comparador, asegurando que el valor medido en el pasador central esté dentro de los valores indicados en la tabla inferior.



| q \ M      | 2      | 3      | 4      | 5      | 6      | 8      | 10     |
|------------|--------|--------|--------|--------|--------|--------|--------|
| 5          | ±0.007 | ±0.008 | ±0.008 | ±0.008 | —      | —      | —      |
| 6          | ±0.01  | ±0.011 | ±0.011 | ±0.016 | ±0.016 | ±0.014 | ±0.015 |
| 6M         | ±0.014 | ±0.015 | ±0.023 | ±0.023 | —      | —      | —      |
| 8          | ±0.027 | ±0.03  | ±0.032 | ±0.033 | —      | —      | —      |
| 10         | ±0.041 | ±0.042 | ±0.045 | ±0.047 | ±0.049 | —      | —      |
| pinΦ (mm)" | 3,35   | 5,3    | 6,7    | 8,35   | 10,55  | 14     | 16,71  |

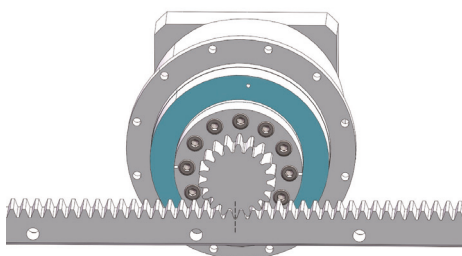
- 5 Una vez instaladas todas las cremalleras, mida tres puntos (centro y ambos extremos de cada tramo) utilizando pasadores de medición y reloj comparador, y verifique que la desviación se encuentra dentro de la tolerancia estándar indicada en la tabla inferior. Determine el punto más alto y monte el engranaje en función de este.

| Calidad de las cremalleras | Q5   | Q6   | Q6M   | Q8    | Q10   |
|----------------------------|------|------|-------|-------|-------|
| Tolerancia                 | 0.02 | 0.03 | 0.045 | 0.065 | 0.125 |

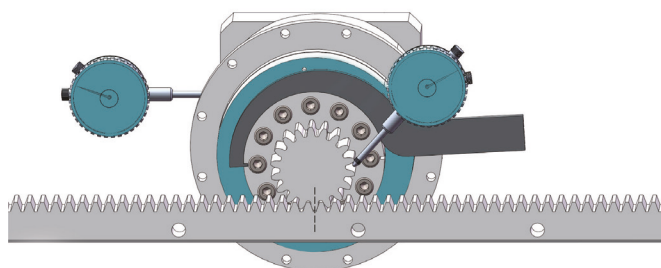


## 6 Instrucciones para el montaje de la cremallera

- 6 Instale los pasadores de posicionamiento. Por ejemplo, si el orificio del pasador en la cremallera es de  $\Phi 5,7$ , primero taladre un orificio  $\Phi 5,7$  en la bancada y elimine las virutas; posteriormente escarie conjuntamente el orificio de la cremallera y de la bancada a  $\Phi 6H7$ . Limpie de nuevo las virutas y, por último, monte los pasadores cilíndricos  $\Phi 6$  con rosca interna (para facilitar el desmontaje).
- 7 Tras montar el engranaje en el reductor, mida el punto más alto del engranaje y márquelo.
- 8 Al instalar el reductor sobre la mesa deslizante, alinee los puntos más altos del engranaje y de la cremallera. Utilice el sistema de ajuste del reductor para regular preliminarmente la holgura entre engranaje y cremallera y apriete los pernos.



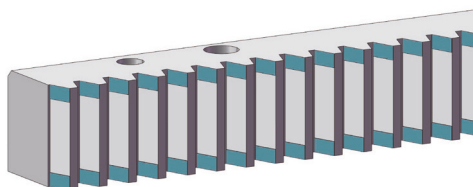
- 9 Sin desplazar el reductor, gire el engranaje con una llave para que contacte con los flancos izquierdo y derecho de la cremallera. La variación indicada por el reloj comparador en el engranaje corresponde al juego (backlash). Compruebe si está dentro de tolerancia; en caso contrario, ajústelo mediante los tornillos de la mesa deslizante hasta cumplir el estándar.



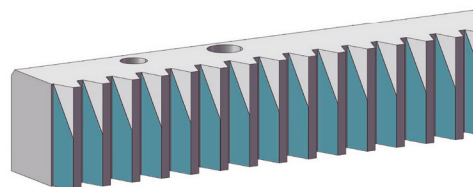
| Calidad de las cremalleras | Q5    | Q6    | Q6M   | Q8    | Q10 |
|----------------------------|-------|-------|-------|-------|-----|
| Juego mínimo               | 0.013 | 0.015 | 0.022 | 0.032 | 0.1 |

## 6 Instrucciones para el montaje de la cremallera

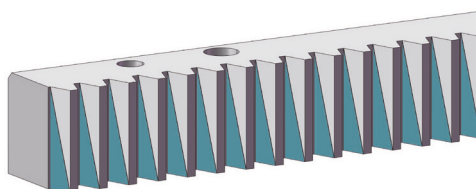
- 10** Verifique que el engrane entre el piñón y la cremallera es correcto. Aplique pintura de control (removible) en los flancos de los dientes de la cremallera y haga girar el engranaje varias veces. Compruebe la zona donde la pintura se ha eliminado y verifique que el patrón de contacto es correcto según los esquemas siguientes; en caso contrario, ajuste el ángulo del reductor hasta lograr un engrane adecuado.



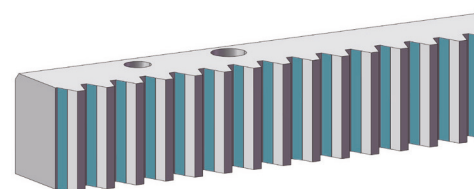
Correcto



No perpendicular



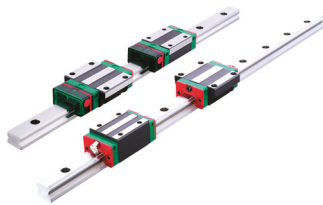
No paralelo



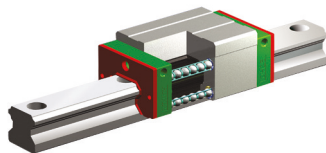
Distancia entre centros incorrecta

- 11** Retire la pintura de control de la superficie de los dientes, limpie completamente la cremallera y el engranaje, y lubrique antes de poner el sistema en funcionamiento.

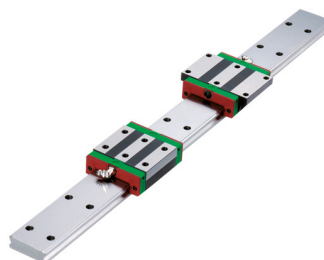
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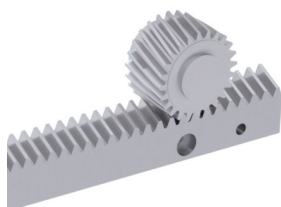
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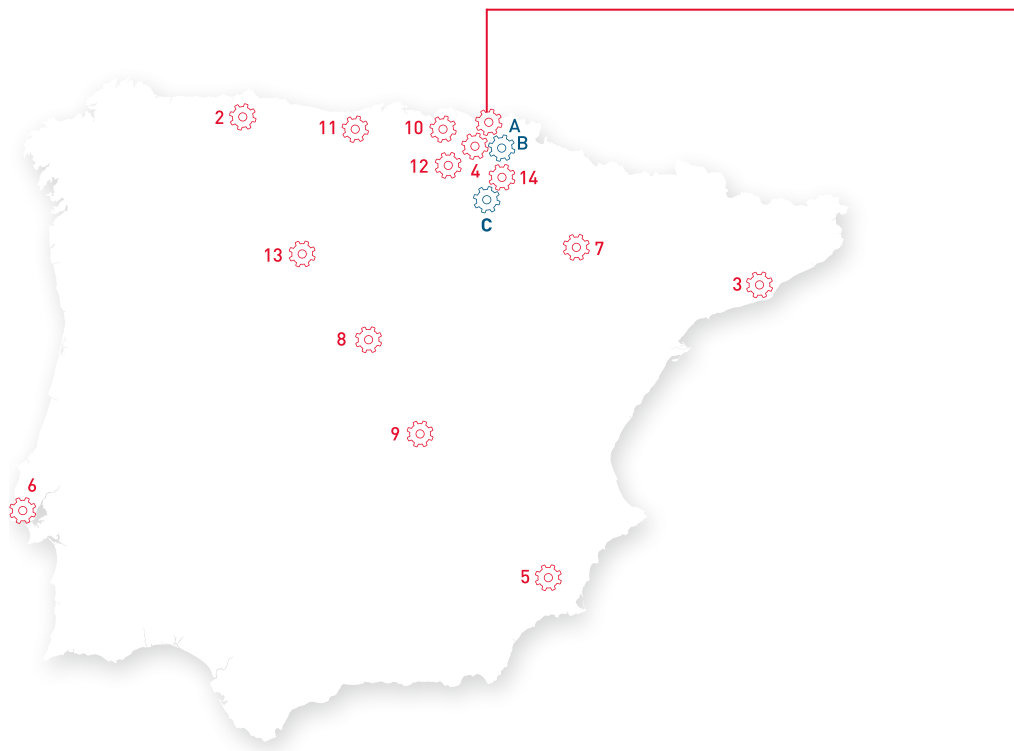
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