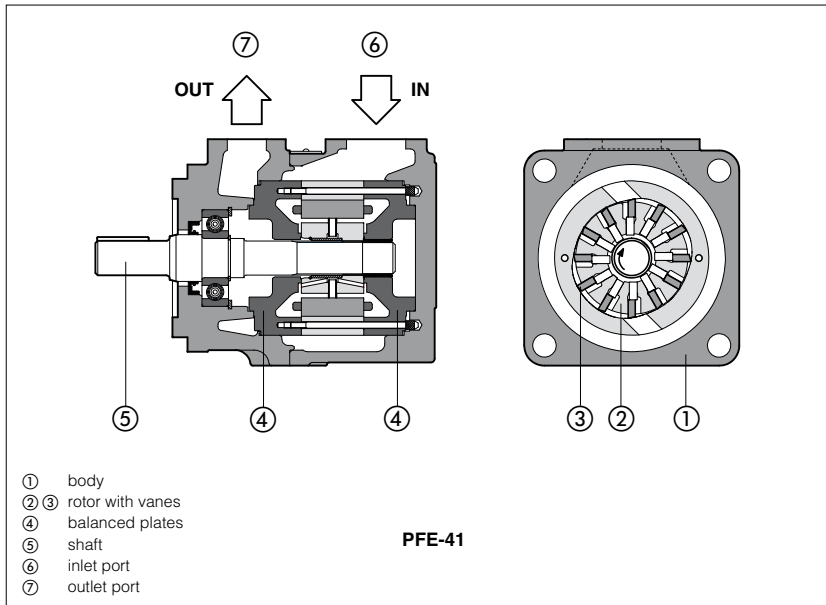


Vane pumps type PFE-31, PFE-41, PFE-51

fixed displacement - cartridge design



PFE are fixed displacement-twelve-vane pumps, ② ③ cartridge design with integral hydraulic balancing ④ for high pressure operation and long service life with low noise level.

Suitable for hydraulic oils according to DIN 51524... 535 or synthetic fluids having similar lubricating characteristics.

These pumps are available as single, multiple or with through-shaft configuration.

Mounting according to SAE J744 standard.

Easy installation as inlet and outlet ports can be assembled in any of four relative positions.

Easy maintenance as the pumping cartridge can be replaced in a few minutes.

Wide variety of displacements up to 150 cm³/rev.

Max pressure 210 bar.

1 MODEL CODE

| | | | | | | | | | |
|--|-----------|-------------|------------|---------------|------------|----------|--|-----------|--|
| PFE | X2 | - 31 | 036 | /31028 | / 1 | D | T | ** | /* |
| Fixed displacement vane pump | | | | | | | | | Synthetic fluids: WG = water-glycol PE = phoposphate ester |
| Additional suffix for multiple pumps: X2 = double pump composed of single vane pumps X3 = triple pump composed of single vane pumps Eventual suffix for pumps with through shaft: XA = for coupling one PFE-31 XB = for coupling one PFE-41 (only for PFE-41 and PFE-51) XC = for coupling one PFE-51 (only for PFE-51) XO = with through shaft, without rear flange Note: multiple pumps are assembled in decreasing order of size. See also tab. A190. | | | | | | | Port orientation, see section 5: T = standard U, V, W = on request | | |
| Size, see section 2: 31, 41, 51 | | | | | | | Direction of rotation (viewed from the shaft end): D = clockwise (supplied standard if not otherwise specified) S = counterclockwise Note: PFE are not reversible | | |
| Displacement [cm ³ /rev], see section 2: for PFE 31: 016, 022, 028, 036, 044 for PFE 41: 029, 037, 045, 056, 070, 085 for PFE 51: 090, 110, 129, 150 | | | | | | | Drive shaft, see section 6 and 7: cylindrical, keyed for single and multiple pump (only first position) 1 = standard 2 = long version (only for PFE-41 and PFE-51) 3 = for high torque applications splined 5 = for single and multiple pumps (any position) 6 = for single and multiple pumps (only first position) 7 = for second and third position in multiple pumps | | |
| Only for multiple pumps PFE [*] : type of second (and third) pump | | | | | | | } only for PFE-31 and PFE-41 | | |

2 OPERATING CHARACTERISTICS at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

| Model | Displacement cm ³ /rev | Max pressure | Speed range rpm (2) | 7 bar (3) | | 70 bar (3) | | 140 bar (3) | | 210 bar (3) | |
|-----------|--------------------------------------|-----------------|------------------------|-----------|-----|------------|------|-------------|------|-------------|------|
| | | | | l/min | kW | l/min | kW | l/min | kW | l/min | kW |
| PFE-31016 | 16,5 | 210 bar (1) | 800-2800 | 23 | 0,5 | 21 | 3 | 19 | 5 | 16 | 8,3 |
| PFE-31022 | 21,6 | | | 30 | 0,6 | 28 | 4 | 26 | 7 | 23 | 10,8 |
| PFE-31028 | 28,1 | | | 40 | 0,8 | 38 | 5,5 | 36 | 10 | 33 | 14 |
| PFE-31036 | 35,6 | | | 51 | 1 | 49 | 7 | 46 | 12,5 | 43 | 17,8 |
| PFE-31044 | 43,7 | | 800-2500 | 63 | 1,3 | 61 | 8 | 58 | 15,5 | 55 | 22 |
| PFE-41029 | 29,3 | | | 41 | 0,8 | 39 | 5,5 | 37 | 10 | 34 | 14,7 |
| PFE-41037 | 36,6 | | | 52 | 1 | 50 | 7 | 48 | 12,5 | 45 | 18,3 |
| PFE-41045 | 45,0 | | | 64 | 1,3 | 62 | 8,5 | 60 | 16 | 57 | 22,6 |
| PFE-41056 | 55,8 | | 800-2000 | 80 | 1,6 | 78 | 11 | 75 | 21 | 72 | 28 |
| PFE-41070 | 69,9 | | | 101 | 2 | 98 | 13,5 | 95 | 26 | 91 | 35 |
| PFE-41085 | 85,3 | | | 124 | 2,4 | 121 | 16 | 118 | 32 | 114 | 43 |
| PFE-51090 | 90,0 | | | 128 | 2,7 | 124 | 17 | 119 | 33 | 114 | 45 |
| PFE-51110 | 109,6 | | 800-2200 | 157 | 3,2 | 152 | 21 | 147 | 40 | 141 | 55 |
| PFE-51129 | 129,2 | | | 186 | 3,7 | 180 | 25 | 174 | 47 | 168 | 65 |
| PFE-51150 | 150,2 | | | 215 | 4,2 | 211 | 29 | 204 | 55 | 197 | 75 |

(1) Max pressure is 160 bar for /PE and /WG versions
 (2) Max speed is 1800 rpm for /PE versions; 1500 rpm for /WG versions
 (3) Flow rate and power consumption are proportional to the rotation speed

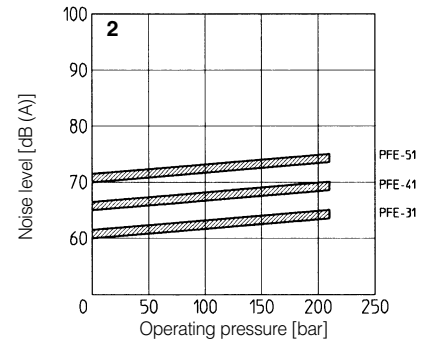
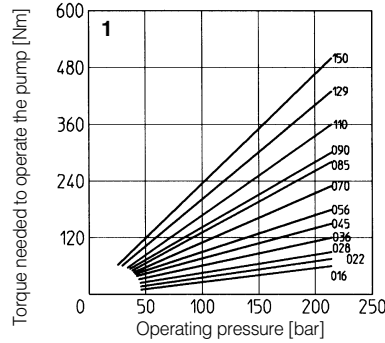
3 MAIN CHARACTERISTICS OF VANE PUMPS TYPE PFE-*1

| | | | |
|------------------------------------|---|--|-------------------------|
| Installation position | Any position. | | |
| Loads on the shaft | Axial and radial loads are not allowed on the shaft. The coupling should be sized to absorb the power peak. | | |
| Ambient temperature | from -20°C to +70°C | | |
| Fluid | Hydraulic oil as per DIN 51524...535; for other fluids see section 1 | | |
| Recommended viscosity | max at cold start max at full power during operation min at full power | 800 mm ² /s 100 mm ² /s 24 mm ² /s 10 mm ² /s | |
| Fluid contamination class | ISO 19/16 (filters at 25 µm value with β ₂₅ ≥ 75 recommended) | | |
| Fluid temperature | -20°C +60°C | -20°C +50°C (W/G seals) | -20°C +80°C (P/E seals) |
| Recommended pressure on inlet port | from -0,15 to 1,5 bar for speed up to 1800 rpm; from 0 to +1,5 bar for speed over 1800 rpm | | |

4 DIAGRAMS (based on mineral oil ISO VG 46 at 50°C)

1 = Torque versus pressure diagram

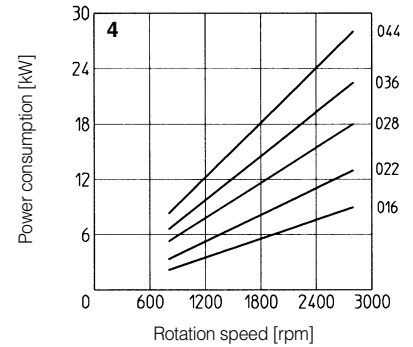
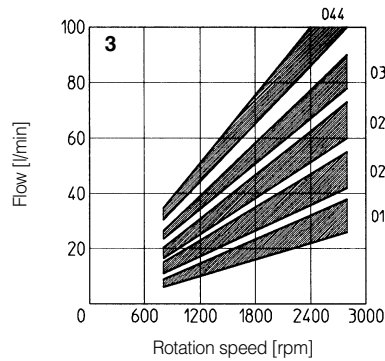
2 = Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics -Test procedure to define the ambient noise level - Pumps
Shaft speed: 1450 rpm.



PFE-31:

3 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

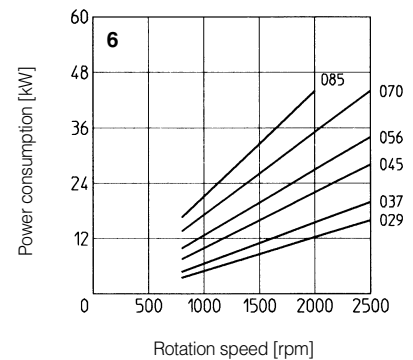
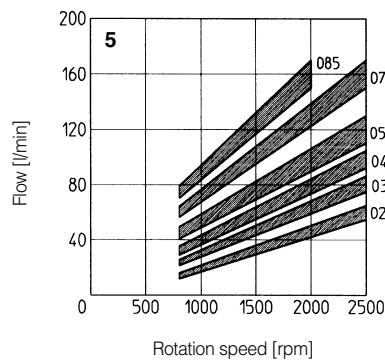
4 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.



PFE-41:

5 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

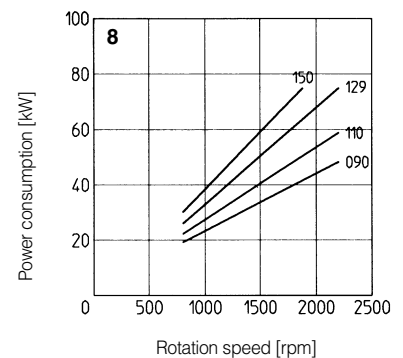
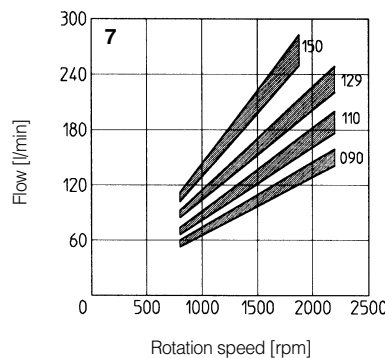
6 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.



PFE-51:

7 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

8 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.



5 PORT ORIENTATION

Single pumps can be supplied with oil ports oriented in different configuration in relation to the drive shaft, as follows (viewed from the shaft end);

T = inlet and outlet ports on the same axis (standard)

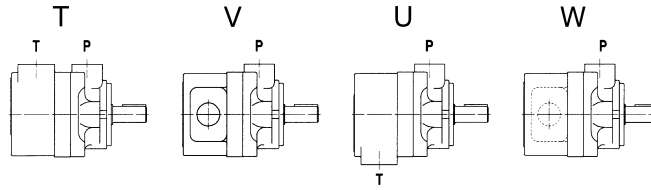
U = outlet orientated 180° with respect to the inlet

V = outlet oriented 90° with respect to the inlet

W = outlet oriented 270° with respect to the inlet

In multiple pumps inlet ports and outlet ports are in line.

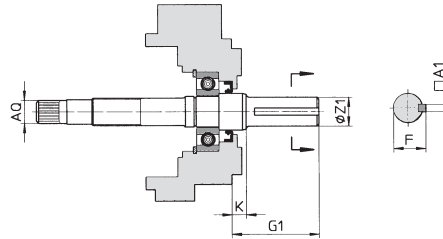
Ports orientation can be easily changed by rotating the pump body that carries inlet port.



6 DRIVE SHAFT

CYLINDRICAL SHAFT KEYED

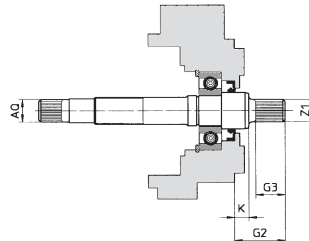
- 1** = for single and multiple pumps (only first position) supplied as standard if not specified in the model code
- 2** = for single and multiple pumps (only first position) long version (only for PFE-41 and PFE-51)
- 3** = for single and multiple pumps (only first position) for high torque applications



| Model | Keyed shaft type 1 (standard) | | | | | | Keyed shaft type 2 | | | | | | Keyed shaft type 3 | | | | | |
|--------|-------------------------------|-------|-------|-------|-------|---------------|--------------------|-------|-------|------|-------|---------------|--------------------|-------|-------|-------|-------|---------------|
| | A1 | F | G1 | K | ØZ1 | Ø AQ | A1 | F | G1 | K | ØZ1 | Ø AQ | A1 | F | G1 | K | ØZ1 | Ø AQ |
| PFE-31 | 4,78 | 21,11 | 56,00 | 8,00 | 19,05 | SAE 16/32-9T | - | - | - | - | - | - | 4,78 | 24,54 | 56,00 | 8,00 | 22,22 | SAE 16/32-9T |
| | 4,75 | 20,94 | | | 19,00 | | | | | | | | 4,75 | 24,41 | | | 22,20 | |
| PFE-41 | 4,78 | 24,54 | 59,00 | 11,40 | 22,22 | SAE 32/64-24T | 6,36 | 25,03 | 71,00 | 8,00 | 22,22 | SAE 32/64-24T | 6,38 | 28,30 | 78,00 | 11,40 | 25,38 | SAE 32/64-24T |
| | 4,75 | 24,41 | | | 22,20 | | 6,35 | 24,77 | | | 22,20 | | 6,35 | 28,10 | | | 25,36 | |
| PFE-51 | 7,97 | 35,33 | 73,00 | 14 | 31,75 | SAE 16/32-13T | 7,95 | 35,33 | 84,00 | 8,10 | 31,75 | SAE 16/32-13T | 7,97 | 38,58 | 84,00 | 14 | 34,90 | SAE 16/32-13T |
| | 7,94 | 35,07 | | | 31,70 | | 7,94 | 35,07 | | | 31,70 | | 7,94 | 38,46 | | | 34,88 | |

SPLINED SHAFT

- 5** = for single and multiple pumps (any position)
 - for PFE-31 according to SAE A 16/32 DP, 9 teeth;
 - for PFE-41 according to SAE B 16/32 DP, 13 teeth;
 - for PFE-51 according to SAE C 12/24 DP, 14 teeth;
- 6** = for single and multiple pumps (only first position)
 - for PFE-31 and PFEX*-31 according to SAE B 16/32 DP, 13 teeth;
 - for PFE-41 and PFEX*-41 according to SAE C 12/24 DP, 14 teeth;
- 7** = for second and third position pump in multiple configuration:
 - for PFEX*-31 according to SAE B 16/32 DP, 13 teeth;
 - for PFEX*-41 according to SAE C 12/24 DP, 14 teeth;



| Model | Splined shaft type 5 | | | | | Splined shaft type 6 | | | | | Splined shaft type 7 | | | | |
|--------|----------------------|-------|------|---------------|---------------|----------------------|----|------|---------------|---------------|----------------------|----|------|---------------|---------------|
| | G2 | G3 | K | Z1 | Ø AQ | G2 | G3 | K | Z1 | Ø AQ | G2 | G3 | K | Z1 | Ø AQ |
| PFE-31 | 32,00 | 19,50 | 6,50 | SAE 16/32-9T | SAE 16/32-9T | 41,00 | 28 | 8,00 | SAE 16/32-13T | SAE 16/32-9T | 32,00 | 19 | 8,00 | SAE 16/32-13T | SAE 16/32-9T |
| PFE-41 | 41,25 | 28 | 8,00 | SAE 16/32-13T | SAE 32/64-24T | 55,60 | 42 | 8,00 | SAE 12/24-14T | SAE 32/64-24T | 41,60 | 28 | 8,00 | SAE 12/24-14T | SAE 32/64-24T |
| PFE-51 | 56,00 | 42 | 8,10 | SAE 12/24-14T | SAE 16/32-13T | - | - | - | - | - | - | - | - | - | - |

7 LIMITS OF SHAFT TORQUE

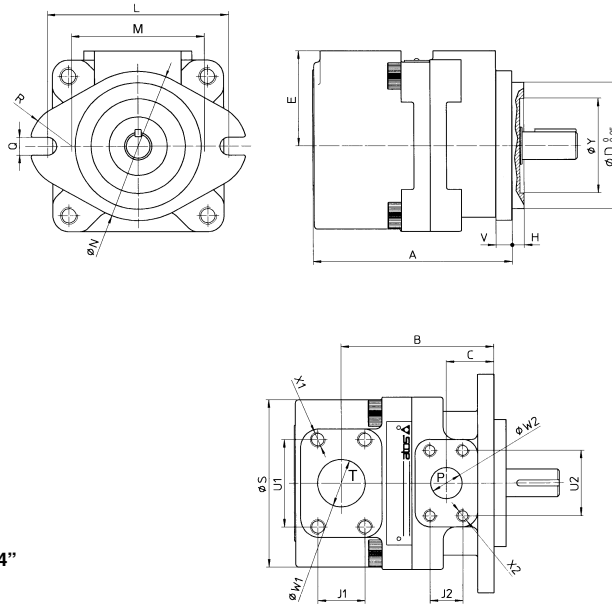
| Pump model | Maximum driving torque [Nm] | | | | | | Maximum torque available at the end of the through shaft [Nm] |
|------------|-----------------------------|--------------|--------------|--------------|--------------|--------------|---|
| | Shaft type 1 | Shaft type 2 | Shaft type 3 | Shaft type 5 | Shaft type 6 | Shaft type 7 | Any type of shaft |
| PFE-31 | 160 | - | 240 | 110 | 240 | 240 | 130 |
| PFE-41 | 250 | 250 | 400 | 200 | 400 | 400 | 250 |
| PFE-51 | 500 | 500 | 850 | 450 | - | - | 400 |

The values of torque required to operate the pumps are shown for each type on the "torque versus pressure" diagram at section 4.

In multiple pumps the total torque applied to the shaft of the first element (drive shaft) is the sum of the single torque needed for operating each single pump and it is necessary to verify that this total torque applied to the drive shaft is not higher than the values indicated in the table.

8 DIMENSIONS OF SINGLE PUMPS [mm]

T = inlet port
P = outlet port



SAE FLANGES

PFE-31: port T = 1 1/4"; port P = 3/4"
PFE-41: port T = 1 1/2"; port P = 1"
PFE-51: port T = 2; port P = 1 1/4"

Mass:

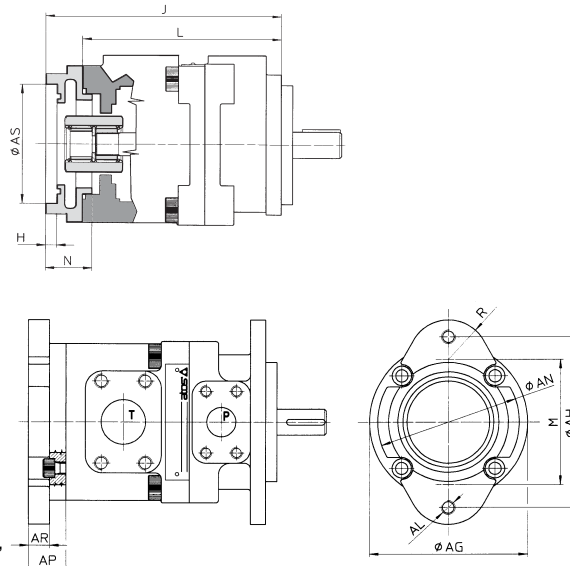
PFE-31 = 9 kg
PFE-41 = 14 kg
PFE-51 = 25,5 kg

SAE flanges can be supplied with the pump, see www.scoda.it, tab. SK155

| Model | A | B | C | ØD | E | H | L | M | ØN | Q | R |
|--------|-------|------|------|-------|------|------|------|-------|--------|--------|------|
| PFE-31 | 136 | 100 | 28 | 82,5 | 70 | 6,4 | 106 | 73 | 95 | 11,1 | 28,5 |
| PFE-41 | 160 | 120 | 38 | 101,6 | 76,2 | 9,7 | 146 | 107 | 120 | 14,3 | 34 |
| PFE-51 | 186,5 | 125 | 38 | 127 | 82,6 | 12,7 | 181 | 143,5 | 148 | 17,5 | 35 |
| Model | ØS | U1 | U2 | V | ØW1 | ØW2 | J1 | J2 | X1 | X2 | ØY |
| PFE-31 | 114 | 58,7 | 47,6 | 10 | 32 | 19 | 30,2 | 22,2 | M10X20 | M10X17 | 47 |
| PFE-41 | 134 | 70 | 52,4 | 13 | 38 | 25 | 35,7 | 26,2 | M12X20 | M10X17 | 76 |
| PFE-51 | 160 | 77,8 | 58 | 15 | 51 | 32 | 42,9 | 30,2 | M12X20 | M10X20 | 76 |

9 DIMENSIONS OF PUMPS WITH THROUGH-SHAFT (FOR MULTIPLE PUMPS) [mm]

T = inlet port
P = outlet port



SAE FLANGES

PFEXA-31: port T = 1 1/4"; port P = 3/4"
PFEXA-41: port T = 1 1/2"; port P = 1"
PFEXB-41: port T = 2; port P = 1 1/4"

For other dimensions, see section 8

| Model | Ø AG | Ø AH | AL | Tightening torque (Nm) ⁽¹⁾ | Ø AN | AP | AR | Ø AS | H | J | L | M | N | R |
|----------|------|------|--------|---------------------------------------|------|------|------|------------------|----------------|-------|-------|-------|----|------|
| PFEXA-31 | 114 | 106 | M10X17 | 70 | 95 | 33 | 25 | 82,57 82,63 | 6,42 6,47 | 165,5 | 132,5 | 79 | 32 | 28,5 |
| PFEXA-41 | 134 | 106 | M10X17 | 70 | 95 | 23 | 11 | 82,57 82,63 | 6,42 6,47 | 194 | 171 | 73 | 32 | 28,5 |
| PFEXB-41 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62 101,68 | 9,73 9,78 | 203 | 171 | 107 | 41 | 34 |
| PFEXA-51 | 134 | 106 | M10X17 | 70 | 95 | 22,7 | 11 | 82,57 82,63 | 6,42 6,47 | 206,2 | 183,5 | 73 | 32 | 28,5 |
| PFEXB-51 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62 101,68 | 9,73 9,78 | 215,5 | 183,5 | 107 | 41 | 34 |
| PFEXC-51 | 134 | 181 | M16 | 300 | 148 | 46,5 | 30,7 | 127,02 127,02 | 12,73 12,78 | 230 | 183,5 | 143,5 | 56 | 35 |

(1) Tightening torque for screw class 12.9