

# Alfa Laval Hygienic fittings DIN EN 10357-A

## Hygienic fittings

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### Introduction

After years of intensive work with the portfolio we have achieved a unique surface appearance across the different DIN Fittings of which we are very proud. We have uniformed our marking, to support our high-quality Fittings and the result is fantastic. We call this range for “DIN Standard, new surface”, to highlight it, and give it a special space in the new catalogue, because it truly is unique. With focus on simplicity we have reduced the surface appearances to two on machined and one on tubular Fittings and we have concentrated on “Hygienic Fittings” with an exception of DIN 11864. We have invested heavily in availability of “DIN Standard, new surface” portfolio and supported by the new automatic warehouse in Kolding and our online ordering tool “Anytime”, this will provide a superior customer experience. Moreover, we have divided the catalogue into the different DIN standards, to show the differences and make it easy to choose the right product.

The old portfolio is, where possible and convenient, upgraded to our “DIN Standard, new surface”, the rest we have kept “as is”. In the price files we have made the following split:

- “DIN Standard, new surface”
- “Fit to DIN Tubes”

The complete DIN Fittings range we supply fits with the tube dimensions of EN 10357-A and DIN 11866- Reihe A (except from DIN 11851 W, which is according to the standard). The products in the chapter “Fit to DIN Tubes”, have deviations from the DIN standards, but will still fit to EN 10357-A tubes.

Thank You for reading this and we hope You enjoy!

### Product presentation

Alfa Laval’s range of DIN Tubes & Fittings are used in food, dairy, beverage, personal care, biotechnology and pharmaceutical process applications. Smooth, crevice-free interiors and secure, self-aligning joints are characteristic for Alfa Laval fittings. Each offers superior corrosion-resistance and unmatched service life. Alfa Laval fittings are designed and manufactured to ensure dimensional accuracy and structural integrity, making them easy to install. Tubing is manufactured to Alfa Laval’s stringent specifications, making it a perfect match for the fittings. All products are labelled with a bar code, product information and



manufacturing date. This provides the optimum identification and ensures that the product arrives to the job site in a clean orbital weld condition. On the product we have laser marked all the needed information such as heat number, dimension, surface, material and country of origin

## DIN Standard, Overview

| Product                  | DIN Standard             | Surface <sup>1</sup> | Material <sup>2</sup>          | Application | Part   |
|--------------------------|--------------------------|----------------------|--------------------------------|-------------|--|
| Tubes                    | EN 10357-<br>A/DIN 11850 | BC, BD, CC and CD    | 1.4307 (304L)<br>1.4404 (316L) | Hygienic    |  |
|                          | DIN 11866-A <sup>3</sup> | H3                   | 1.4404 (316L)                  | Aseptic     |  |
|                          | DIN 11852                | HSF3<br>HSF2         | 1.4307 (304L)<br>1.4404 (316L) | Hygienic    |  |
| Bends, Tees and Reducers | DIN 11865 <sup>3</sup>   | H3                   | 1.4404 (316L)                  | Aseptic     | For Welding. Ends are ready for<br>Orbital Welding                 |
|                          | DIN 11851                | HSF0                 | 1.4307 (304L)<br>1.4404 (316L) | Hygienic    | (Screw connections)<br>W: Expanding<br>S: Welding                  |
| Connections              | DIN 11853                | H3                   | 1.4404 (316L)                  | Hygienic    | 1: Screw connection<br>2: Flange connection<br>3: Clamp connection |
|                          | DIN 11864                | H3                   | 1.4404 (316L)                  | Aseptic     | 1: Screw connection<br>2: Flange Connection<br>3: Clamp connection |
|                          | DIN 32676                | HSF0                 | 1.4307 (304L)                  | Hygienic    | Clamp connection   |
|                          |                          | H3                   | 1.4404 (316L)                  |             |  |

<sup>1</sup> Surface table is available later in the document

<sup>2</sup> Material is according to EN 10088-1. Regarding complete Connections, Nut is always in 1.4301. A Nut in 1.4404 is available as a single item. We hold the right to deliver better material than stated in our brochures and order confirmation. Meaning, if stated 1.4301, it is allowed for us to deliver 1.4307 or 1.4404, at same price of course.

<sup>3</sup> We do currently not offer this part of the DIN standard

## Content

- [Tubes](#)
- [Bends, Tees and Reducers](#)
- [Connections](#)
- [Marking and surface](#)
- [Basics](#)
- [Rubber material and application](#)
- [Pressure ratings](#)
- [Steelgrades](#)
- [Treatment of stainless steel](#)
- [Elastomer review](#)

## Tubes

### Material and surface overview

| Standard               | Material                       | Symbol | Surface   |   |   | Heat Treatment |
|------------------------|--------------------------------|--------|---|---|---|----------------|
|                        |                                |        | External surface and Welded area  | Internal surface                                      | Internal Welded area                                  |                |
| EN 10357-A / DIN 11850 | 1.4307 (304L)<br>1.4404 (316L) | CC     | Pickled and passivated  | Ra < 0.8 µm Pickled and passivated                    | Ra < 1.6 µm Pickled and passivated                    | No             |
|                        |                                | CD     | Polished<br>Ra < 1.0 µm   |   |   |                |
|                        |                                | BC     | Pickled and passivated or Bright annealed                                     | Ra < 0.8 µm Pickled and passivated or Bright annealed | Ra < 1.6 µm Pickled and passivated or Bright annealed | Yes            |
|                        |                                | BD     | Polished<br>Ra < 1.0 µm   |   |   |                |
| DIN 11866-A            | 1.4404 (316L)                  | H3     | Pickled or Bright annealed without Ra requirement, or Polished to Ra < 1.0 µm | Ra < 0.8 µm   | Ra < 0.8 µm   | Yes            |

### Sizes



**Note!** We supply EN10357-A which has the same dimensions as former DIN 11850 Reihe 2, and DIN 11866-A. Please also notice "Nominal size" is not always equal to inner diameter (see DN15, DN25, DN40, DN65 and DN 80). The EN 10357-A standard is only referring to outer diameter. All dimensions in this catalogue are in millimeter.

| Nominal size (only DIN 11866) | OD (outer diameter) | ID (inner diameter) | t (wall thickness) |
|-------------------------------|---------------------|---------------------|--------------------|
| DN10                          | 13                  | 10                  | 1.5                |
| DN15                          | 19                  | 16                  | 1.5                |
| DN20                          | 23                  | 20                  | 1.5                |
| DN25                          | 29                  | 26                  | 1.5                |
| DN32                          | 35                  | 32                  | 1.5                |
| DN40                          | 41                  | 38                  | 1.5                |
| DN50                          | 53                  | 50                  | 1.5                |
| DN65                          | 70                  | 66                  | 2                  |
| DN80                          | 85                  | 81                  | 2                  |
| DN100                         | 104                 | 100                 | 2                  |
| DN125                         | 129                 | 125                 | 2                  |
| DN150                         | 154                 | 150                 | 2                  |
| DN200                         | 204                 | 200                 | 2                  |

### Tolerances

#### Outer diameter tolerances



**Note!** Outer diameter tolerances in DIN 11866 are lower from DN100 to DN200.

| Nominal size: | DN10      | DN15      | DN20      | DN25      | DN32      | DN40      | DN50      | DN65      | DN80      | DN100      | DN125      | DN150      | DN200      |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| <b>OD:</b>    | <b>13</b> | <b>19</b> | <b>23</b> | <b>29</b> | <b>35</b> | <b>41</b> | <b>53</b> | <b>70</b> | <b>85</b> | <b>104</b> | <b>129</b> | <b>154</b> | <b>204</b> |
| EN 10357-A    | ±0,10     | ±0,10     | ±0,12     | ±0,15     | ±0,18     | ±0,21     | ±0,27     | ±0,35     | ±0,43     | ±0,78      | ±0,97      | ±1,16      | ±1,53      |
| DIN 11866     | ±0,10     | ±0,10     | ±0,12     | ±0,15     | ±0,18     | ±0,21     | ±0,27     | ±0,35     | ±0,43     | ±0,52      | ±0,65      | ±0,77      | ±1,02      |

#### Wall thickness tolerances



**Note!** Wall thickness tolerances in DIN 11866 are lower from DN65 to DN200.

| Nominal size: | DN10      | DN15      | DN20      | DN25      | DN32      | DN40      | DN50      | DN65      | DN80      | DN100      | DN125      | DN150      | DN200      |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| <b>OD:</b>    | <b>13</b> | <b>19</b> | <b>23</b> | <b>29</b> | <b>35</b> | <b>41</b> | <b>53</b> | <b>70</b> | <b>85</b> | <b>104</b> | <b>129</b> | <b>154</b> | <b>204</b> |
| EN 10357-A    | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,20     | ±0,20     | ±0,20      | ±0,20      | ±0,20      | ±0,20      |
| DIN 11866     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15     | ±0,15      | ±0,15      | ±0,15      | ±0,15      |

### EN 10357-A/DIN 11850

The stainless-steel tubes in this standard are for the food, chemical and pharmaceutical industry.

Typically used with DIN 11852, DIN 11851, DIN 11853 and DIN 32676.

BC and BD tubes are annealed, whereas CC and CD tubes are pickled and passivated internal and external

All materials according to EN 10217-7.

#### DIN 11866

The stainless-steel tubes in this standard are for aseptic, chemical and pharmaceutical industry

Typically used with DIN 11864 and DIN 11865.

All tubes are annealed, pickled and passivated in accordance with DIN EN 10217-7 W2Ab.

#### Comment to DIN 11851 W

##### DIN 11850 Reihe 1, different measures up to DN50:



**Note!** Regarding Connections DIN 11851 W (Expanding), this is the only product in this catalogue which does not match tube EN 10357-A from sizes up to DN50, above DN50 they fit. This standard is meant for the old "DIN 11850, Reihe 1".

| Dimensions | DN10 | DN15 | DN20 | DN25 | DN32 | DN40 | DN50 |
|------------|------|------|------|------|------|------|------|
| OD         | 12   | 18   | 22   | 28   | 34   | 40   | 52   |
| ID         | 10   | 16   | 20   | 26   | 32   | 38   | 50   |
| Thickness  | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

## Bends, Tees and Reducers

DIN 11852 overview

### Tees

| Type Name | Design Name                                | Comment           | Picture   |
|-----------|--|-------------------|---|
| Tees      | TS<br>$d_1=d_2$                            | Standard Tee      |  |
|           | RTS<br>$d_1>d_2$<br>( $d_2$ pointing down) | Reduced Tee       |  |
|           | TK<br>$d_1=d_2$                            | Short Tee         |  |
|           | RTK<br>$d_1>d_2$<br>( $d_2$ pointing down) | Reduced Short Tee |  |

### Reducers

| Type Name | Design Name | Comment            | Picture  |
|-----------|-------------|--------------------|--|
| Reducers  | RK          | Concentric Reducer |   |
|           | RE          | Eccentric Reducer  |  |

Example of the Alfa Laval name for a short tee according to DIN 11852:

**TEE TK DN25 HSF3 1.4404 DIN 11852**



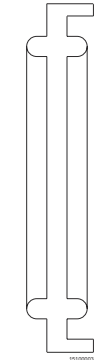
| TEE       | TK          | DN25         | HSF3    | 1.4404   | DIN 11852 |
|-----------|-------------|--------------|---------|----------|-----------|
| Type Name | Design Name | Nominal Size | Surface | Material | Standard  |

# Bends

| Type Name | Design Name         | Comment                             | Picture   |
|-----------|---------------------|-------------------------------------|---|
|           | BS-90               | Standard Bend 90 Degrees            | <br>12020001   |
|           | BS-45               | Standard Bend 45 Degrees            | <br>12020002   |
|           | BS-180              | Standard Bend 180 Degrees           | <br>12020003   |
| Bends     | BA5-90 <sup>3</sup> | Radius and $l_0$ are the same in mm | <br>12020004  |
|           | BL-90               | Long Bend 90                        | <br>12020005 |
|           | BL-45               | Long Bend 45                        | <br>12020006 |

## Connections

### Gasket overview

| DIN Standard | Surface    | Material<br>(Steel parts)      | Material<br>(Rubber parts)      | Part  | Seal Type   |
|--------------|------------|--------------------------------|---------------------------------|---|---|
| DIN 11851    | HSF0       | 1.4307 (304L)<br>1.4404 (316L) | EPDM<br>FPM<br>NBR<br>PTFE<br>Q | Screw Connection<br>W: Expanding<br>(only 11851, Liner and Male end are expanded to the tube)<br>S: Welding | <br>Gasket (G)   |
| DIN 11853    | H3         | 1.4404 (316L)                  | FPM<br>EPDM                     | 1: Screw Connection<br>2: Flange Connection<br>3: Clamp Connection  | <br>O-Ring (R)  |
| DIN 11864    | H3         | 1.4404 (316L)                  | FPM<br>EPDM                     | 1: Screw Connection<br>2: Flange Connection<br>3: Clamp Connection  |   |
| DIN 32676    | H3<br>HSF0 | 1.4307 (304L)<br>1.4404 (316L) | PTFE<br>FPM                     | Clamp Connection  | <br>Gasket (D) |

### DIN 11851 overview

All Connections in DIN 11851 are screw connections

| Parts Type<br>Name       | Parts Design<br>Name | Connection<br>Name | Comment                                     |
|--------------------------|----------------------|--------------------|---|
| Male<br>(Gewindestutzen) | C                    | W                  | Connection to tube by expanding, DN10-DN100 |
| Liner<br>(Kegelstutzen)  | D                    | W                  |   |
| Male<br>(Gewindestutzen) | SC                   | S                  | Connection to tube by welding, DN10-DN150   |
| Liner<br>(Kegelstutzen)  | SD                   | S                  |   |
| Male<br>(Gewindestutzen) | SKC                  | SK (Short)         |   |
| Liner<br>(Kegelstutzen)  | SKD                  | SK (Short)         |   |

| Parts Type Name                      | Parts Design Name | Connection Name | Comment  |
|--------------------------------------|-------------------|-----------------|--|
| Blind Male<br>(Blind-Gewindestutzen) | BC                |                 | Alfa Laval does currently not offer this (real design name is "C")   |
| Blind Liner<br>(Blind-Kegelstutzen)  | BD                |                 | The real design name is "D" but Alfa Laval has chosen to call it "BD".<br>The blind is not expanded or welded to the tube, therefore it can be used for all connection versions in DIN 11851 |
| Nut<br>(Nutüberwurfmutter)           | F                 |                 | Used for all connection versions in DIN 11851  |
| Gasket<br>(Dichtring)                | G                 |                 | Used for all connection versions in DIN 11851  |

A Complete connection is Male + Liner + Gasket + Nut. It is possible to blind from Liner side. Please do not mix connection W with connection S.

The "Connection Name" equal to W, is from the German word, Walzen, which in English is translated to Expanding.

The "Connection Name" equal to S, is from the German word, Schweissen, which in English is translated to Welding.

The "Connection Name" equal to SK, is from the German word, Schweissen, Kurz, which in English is translated to Welding, Short.

Examples of DIN 11851 products:

| SKC:    |  |       |      |
|---------|--|-------|------|
| S       |  | K     | C    |
| Welding |  | Short | Male |

| SKD:    |  |       |       |
|---------|--|-------|-------|
| S       |  | K     | D     |
| Welding |  | Short | Liner |

Example of the Alfa Laval name for a complete Connection, DIN 11851:

#### CONNECTION S DN50 HSF0 1.4307 DIN 11851 EPDM

| CONNECTION | S                          | DN50         | HSF0    | 1.4307   | DIN 11851 | EPDM      |
|------------|----------------------------|--------------|---------|----------|-----------|-----------|
| Type Name  | Design Name<br>(S=Welding) | Nominal Size | Surface | Material | Standard  | Seal Type |

Example of the Alfa Laval name for a Male, DIN 11851:

#### MALE SC DN50 HSF0 1.4307 DIN 11851

| MALE      | SC          | DN50         | HSF0    | 1.4307   | DIN 11851 |
|-----------|-------------|--------------|---------|----------|-----------|
| Type Name | Design Name | Nominal Size | Surface | Material | Standard  |

#### [DIN 11853 overview](#)

We state this product group is for hygienic application, but please be aware it is using the same O-ring as 11864 which is for aseptic applications, the only difference between the two standards is the "build in length". "Build in length" of DIN 11864 is longer than DIN 11853, which makes it easier to perform orbital welding.

#### [DIN 11853-1](#)

##### Screw Connection (Verschraubungen)

| Parts Type Name  | Parts Design Name | Connection Name |
|--|-------------------|-----------------|
| Male<br>(Gewindestutzen)   | GS                | V               |
| Liner<br>(Bundstutzen)   | BS                | V               |
| Blind Male<br>(Blindgewindestutzen)<br>(Same item as in 11864-1) | BGS               | V               |
| Blind Liner<br>(Blindbundstutzen)<br>(Same item as in 11864-1)   | BBS               | V               |
| Nut<br>(Nutüberwurfmutter)                                       | F (DIN 11851)     | V               |
| O-Ring   | R                 | V               |

A complete connection (V) is: Male (GS) + Liner (BS) + O-Ring (R) + Nut (F).



It is possible to blind from both Liner and Male side, you will have to replace normal Male or Liner. The Nut for DIN 11853 is the same as in DIN 11851.

### DIN 11853-2

#### Flange Connection (Flanschverbindung)

| Parts Type Name  | Parts Design Name | Connection Name |
|--|-------------------|-----------------|
| <b>Currently not part of offering</b>                                  |                   |                 |
| Flange Groove<br>(Nutflansch)  | NF                | F               |
| <b>Currently not part of offering</b>                                  |                   |                 |
| Flange Collar<br>(Bundflansch)   | BF                | F               |
| Blind Flange Groove<br>(Blindnutflansch)<br>(Same item as in 11864-2)  | BNF               | F               |
| Blind Flange Collar<br>(Blindbundflansch)<br>(Same item as in 11864-2) | BBF               | F               |
| Screw<br>(Sechskantshraube, DIN EN ISO 4017)                           |                   | F               |
| Nut<br>(Sechskantmutter, DIN ISO 4032)                                 |                   | F               |
| O-Ring   | R                 | F               |

For NF and BF please use 11864-2 NF and BF

A complete connection (F) is Flange Groove (NF) + Flange Collar (BF) + O-Ring (R) + Screw and Nut set.

It is possible to blind from both Groove and Collar side, you will have to replace normal Groove or Collar.

### DIN 11853-3

#### Clamp Connection (Klemmverbindung)

| Parts Type Name  | Parts Design Name | Connection Name |
|--|-------------------|-----------------|
| <b>Currently not part of offering</b>  |                   |                 |
| Clamp Liner Groove<br>(Nutmlemmstutzen)  | NKS               | K               |
| <b>Currently not part of offering</b>  |                   |                 |
| Clamp Liner Collar<br>(Bundklemmstutzen)   | BKS               | K               |
| Blind Clamp Liner Groove<br>(Blindnutklemmstutzen)<br>(Same item as in 11864-3)  | BNKS              | K               |
| Blind Clamp Liner Collar<br>(Blindbundklemmstutzen)<br>(Same item as in 11864-3) | BBKS              | K               |
| Clamp Ring<br>(Klammer)  |                   | K               |
| O-Ring   | R                 | K               |

For NKS and BKS please use from 11864-3.

A complete connection (K) is: Clamp Liner Groove (NKS) + Clamp Liner Collar (BKS) + O-Ring (R) + Clamp Ring.

It is possible to blind from both Groove and Collar side, you will have to replace normal Groove or Collar.

### DIN 11864

#### DIN 11864-1

Same structure as DIN 11853-1. Only "build in length" is different on Male and Liner (GS and BS), both are longer in the DIN 11864-1 version.

## Screw Connection (Verschraubungen)

| Parts Type Name                     | Parts Design Name | Connection Name |
|-------------------------------------|-------------------|-----------------|
| Male<br>(Gewindestutzen)            | GS                | V               |
| Liner<br>(Bundstutzen)              | BS                | V               |
| Blind Male<br>(Blindgewindestutzen) | BGS               | V               |
| Blind Liner<br>(Blindbundstutzen)   | BBS               | V               |
| Nut<br>(Nutüberwurfmutter)          | F (DIN 11851)     | V               |
| O-Ring                              | R                 | V               |

A complete connection (V) is: Male (GS) + Liner (BS) + O-Ring (R) + Nut (F).

It is possible to blind from both Liner and Male side. Both “Blind Male” and “Blind Liner” are equal to the ones in DIN 11853-1. The Nut for DIN 11864 is the same as in DIN 11851.

### DIN 11864-2

Same structure as DIN 11853-2. Only “build in length” is different on Flange Groove and Flange Collar (NF and BF), both are longer in the DIN 11864-2 version.

## Flange Connection (Flanschverbindung)

| Parts Type Name                               | Parts Design Name | Connection Name |
|---|-------------------|-----------------|
| Flange Groove<br>(Nutflansch)                 | NF                | F               |
| Flange Collar<br>(Bundflansch)                | BF                | F               |
| Blind Flange Groove<br>(Blindnutflansch)      | BNF               | F               |
| Blind Flange Collar<br>(Blindbundflansch)     | BBF               | F               |
| Screw<br>(Sechskantschraube, Din En Iso 4017) |                   | F               |
| Nut<br>(Sechskantmutter, Din En Iso 4032)     |                   | F               |
| O-Ring  | R                 | F               |

It is possible to blind from both Groove and Collar side, BNF and BBF in DIN 11853-2 and DIN 11864-2 are identical.

A complete connection (F) is: Flange Groove (NF) + Flange Collar (BF) + O-Ring (R) + Screw and Nut set.

### DIN 11864-3

Same structure as DIN 11853-3. Only “build in length” is different on “Clamp Liner Groove” and Clamp Liner Collar (NKS and BKS), both are longer in the DIN 11864-3 version.

## Clamp Connection (Klemmverbindung)

| Parts Type Name                                     | Parts Design Name | Connection Name |
|---|-------------------|-----------------|
| Clamp Liner Groove<br>(Nutklemmstutzen)             | NKS               | K               |
| Clamp Liner Collar<br>(Bundklemmstutzen)            | BKS               | K               |
| Blind Clamp Liner Collar<br>(Blindbundklemmstutzen) | BNKS              | K               |
| Blind Clamp Liner Collar<br>(Blindbundklemmstutzen) | BBKS              | K               |
| Clamp Ring<br>(Klammer)                             |                   | K               |
| O-Ring  | R                 | K               |

A complete connection (K) is: Clamp Liner Groove (NKS) + Clamp Liner Collar (BKS) + O-Ring (R) + Clamp Ring.

It is possible to blind from both Groove and Collar side, BNKS and BBKS in DIN 11853-3 and DIN 11864-3 are identical.

## DIN 32676

### Clamp Connection (Klemmverbindung)

| Parts Type Name                      | Parts Design Name | Connection Name |
|--------------------------------------|-------------------|-----------------|
| Ferrule Short<br>(Klemmstutzen Kurz) | KK                | KK<br>KL        |
| Ferrule Long<br>(Klemmstutzen Lang)  | KL                | KK<br>KL        |
| Blind<br>(Blindklemmstutzen)         | B                 | KK<br>KL        |
| Gasket<br>(Dichtring)                | D                 | KK<br>KL        |
| Clamp Ring<br>(Klammer)              |                   | KK<br>KL        |

A complete connection is: Ferrule x 2 + Gasket (D) + Clamp Ring.

It is possible to blind from both sides by changing one of the Ferrules with a Blind.

### Length of assembled connections

#### Approx. length in mm of the assembled connections (Baulänge)

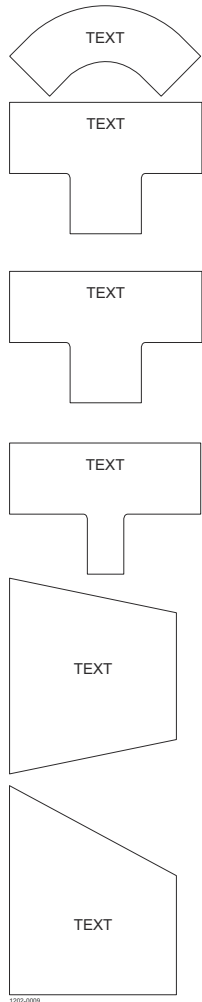
| Nominal size | DIN 11851 |    | DIN 11853 |    |    | DIN 11864 |     |     | DIN 32676 |       |
|--------------|-----------|----|-----------|----|----|-----------|-----|-----|-----------|-------|
|              | W and S   | SK | 1         | 2  | 3  | 1         | 2   | 3   | KK        | KL    |
| DN10         | 35        | 27 | 32        | 48 | 44 | 76        | 80  | 76  | 37.7      | 58.9  |
| DN15         | 35        | 27 | 32        | 48 | 44 | 76        | 80  | 76  | 37.7      | 58.9  |
| DN20         | 37        | 27 | 34        | 48 | 44 | 76        | 80  | 76  | 37.7      | 58.9  |
| DN25         | 45        | 31 | 42        | 48 | 44 | 77        | 80  | 77  | 44.7      | 73.7  |
| DN32         | 51        | 31 | 48        | 48 | 48 | 88        | 90  | 88  | 44.7      | 73.7  |
| DN40         | 53        | 31 | 50        | 48 | 48 | 88        | 90  | 88  | 44.7      | 73.7  |
| DN50         | 57        | 33 | 54        | 48 | 49 | 89        | 90  | 89  | 44.7      | 73.7  |
| DN65         | 65        | 35 | 62        | 48 | 53 | 113       | 108 | 113 | 57.7      | 97.7  |
| DN80         | 75        | 35 | 72        | 52 | 57 | 117       | 116 | 117 | 57.7      | 97.7  |
| DN100        | 89        | 41 | 86        | 52 | 60 | 120       | 116 | 120 | 57.7      | 97.7  |
| DN125        | 70        | 49 |           | 56 |    |           | 120 |     | 57.7      | 133.7 |
| DN150        | 76        | 56 |           | 56 |    |           | 120 |     | 57.7      | 133.7 |

## Marking and surface

### Marking

In Alfa Laval we have chosen to mark our product as shown in this chapter. The marking provides all the needed information and is placed logical on the products.

### Tubular



Tube dimensions:

Outer diameter and wall thickness

Surface

On reduced items both sizes has to be written

See AL "description" on AL 2061 300

ALFA LAVAL® - OD<sub>1</sub>T<sub>1</sub> / OD<sub>2</sub>xT<sub>2</sub>XXXX  
X.XXX (XXX) XX-HT: XXXXXXX/XXXXX

Material type:  
EN (AISI)

Country of origin:  
ISO 3166-1  
ALPHA-2 code

Heat number:  
Write number for all parts

Font: Helvetica or Arial

Font size: adjusted to the tube size

Example on straight fitting with one heat number:

ALFA LAVAL® - 70x2.0 HSF3

1.4307 (304L) CN-HT:123456

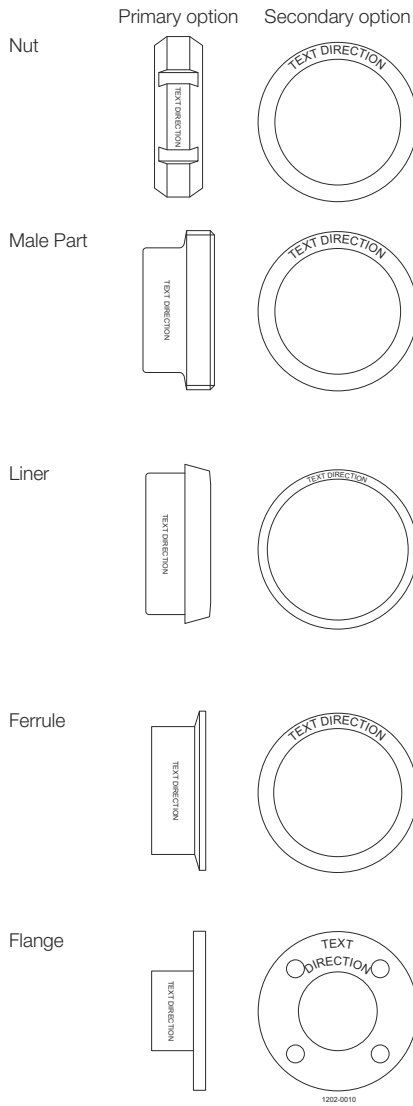
Example on reduced fitting with two heat number:

ALFA LAVAL® - 70x2.0/ 41x1.5 HSF3

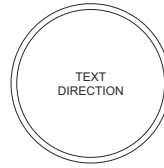
1.4307 (304L) IN-HT:123456/789012

### Machined

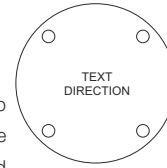
Some of our machined products are very small and marking on the optimal place is impossible therefore we use "Secondary Option" instead of "Primary Option".



End cap  
union and  
ferrule  
Blind

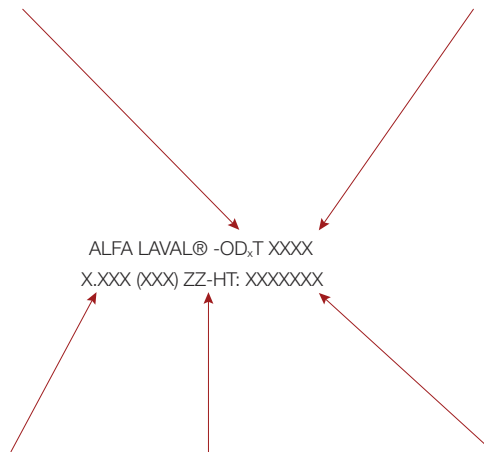


End cap  
flange  
Blind



Dimensions:  
Outer diameter and wall thickness  
On nut and blanks the standard size is  
added.  
Eg.: for DIN: DIN:DN50, For ISO: 2

Surface:  
See "AL description" on AL 2062 301



ALFA LAVAL® -OD,T XXXX  
X.XXX (XXX) ZZ-HT: XXXXXXX

Material type:  
EN (AISI)

Country of origin:  
ISO 3166-1  
ALPHA-2 code

Heat number:  
Nut do not have a heat  
number  
All other fittings need a heat  
number

Font: Helvetica or Arial  
Font size: adjusted to the tube size  
Example on male part, liner, ferrule and flange  
ALFA LAVAL® - 70x2.0 HSF0  
1.4301 (304) CN-HT: 123456  
Example on nut and blanks  
ALFA LAVAL® - 70x2.0/HSF0  
1.4301 (304) IN-HT: 123456  
Example on secondary option, on nut, male part, liner  
and ferrule  
ALFA LAVAL® - 70x2.0 HSF0 1.4301 (304) DK-HT: 123456

### Surface descriptions

We have chosen to provide a limited choice, most used, of all the surface possibilities. We have given them an Alfa Laval name. The names and descriptions are like in the below table.

Our surface philosophy has been to create a uniform surface finish which meets the standard or better and at the same time fits with the outer surface appearance of the DIN tubes across all DIN Fittings. The range "DIN Standard, new surface" will provide this benefit and will be visible in plants using Alfa Laval DIN Fittings only.

The new uniform appearance of all Alfa Laval DIN Fittings is also the reason for new surface descriptions. This is a unique product and therefore it deserves a unique surface description.

The surface on tubular fittings exceeds the requirement in DIN 11852. We are meeting the requirements to surface roughness in EHEDG and 3A. Our customers are therefore buying a product with a better surface roughness than most of the market supplies.

## Machined Fittings

| AL description | Standard          | Surface texture R <sub>a</sub> μm (μ-inch) |            |
|----------------|-------------------|--|------------|
|                |                   | Wetted                                     | Not wetted |
| HSF0           | DIN<br>(Hygienic) | < 0.8 (32)                                 | < 1.6 (64) |
| H3             | DIN UltraPure     | < 0.8 (32)                                 | < 1.0 (40) |

## Tubular Fittings

| AL description    | Standard       | Surface structure<br>ID/OD | Surface texture R <sub>a</sub> μm (μ-inch) |            |                        |                        |
|-------------------|----------------|----------------------------|--|------------|------------------------|------------------------|
|                   |                |                            | Wetted                                     |            | Not wetted             |                        |
|                   |                |                            | Surface                                    | weld bead  | Surface                | weld bead              |
| HSF2              | DIN (Hygienic) | Polished/Shot blasted      | <0.8 (32)                                  | <0.8 (32)  | <1.6 (64) <sup>1</sup> | <1.6 (64) <sup>1</sup> |
| HSF3 <sup>2</sup> | DIN (Hygienic) | Polished/Polished          | < 0.8 (32)                                 | < 0.8 (32) | < 0.8 (32)             | < 0.8 (32)             |

<sup>1</sup> Tolerances according to DIN 11852

<sup>2</sup> For sizes larger than DN100, the "Not wetted" surface Ra can be up to 1.0 μm.

Our products are mechanical polished. Mechanical polishing is achieved by using a progressive series of abrasives, from low to high grit. This allows a consistent internal finish and both optimal and economical cleaning.

HSF2 is our tubular "MAT" version. Inside it is polished to Ra <0.8 and outside it is shot blasted to a surface Ra<1.6

## Basics

### Test procedure

Our manufacturing facilities operate under an approved ISO 9001 quality standard. Wall thickness integrity is maintained using fabrication grade minimum wall tubing for all cold-formed tubular products.

Our fittings are put through visual inspection and ovality and squareness tolerances are inspected with calibrated equipment. Surface finish is inspected with calibrated profilometer to ensure the Roughness average (Ra) maximum is not exceeded.

### Certificates

All product wetted stainless-steel products are delivered with a 3.1 certificate in accordance to EN 10204.

### Packing

We protect our products by packing them into high quality cardboard boxes. This ensure they keep the high quality during storing and transportation.

Packing sizes as below:

DN10-DN80 = 10 pcs per cardboard box

DN100 = 5 pcs per cardboard box

> DN100 = 1 pcs per cardboard box

## Rubber

### Rubber Materials

In order to obtain the longest possible lifetime for rubber seals it is essential to choose the right quality for the actual duty. Consequently when choosing rubber quality, the characteristics of the different rubber types should be considered. All product wetted rubber material are in conformity of FDA.

### EPDM Rubber (Ethylene Propylene)

EPDM rubber is widely used within the food industry as it is resistant to most products used in this sector. Another advantage is that it may be used to a recommend max. temperatures of 140°C (244°F). However, there is one essential limitation, EPDM is not resistant to organic and non-organic oils and fats. The resistance to ozone is excellent.

### Acrylonitrile Butadiene Rubber, NBR

NBR is the rubber type most frequently used for technical purposes. It is quite resistant to most hydrocarbons, e.g oil, grease and fat. It is sufficiently resistant to diluted lye and nitric acid and may be used to a recommend max. 95°C (203°F). As NBR is attacked by ozone it may not be exposed to ultraviolet rays and should thus consequently be stored so that this is avoided.

### Silicone Rubber, Q

The most significant quality of silicone rubber is that it can be applied from temperatures below -50°C (-58°F) to approx. + 180°C (356°F) and still keep its elasticity. The chemical resistance is satisfactory to most products. However, undiluted lye and acids as well as hot water and steam may destroy silicone rubber. The resistance to ozone is good.

### Fluorine Rubber, FPM

FPM is often used when other rubber types are unsuited, especially at high temperatures up to approx. 180°C (356°F). The chemical resistance is good to most products, however hot water, steam, lye, acid and alcohol should be avoided. The resistance to ozone is good.

### Hydrogenated acrylonitrileButadiene Rubber, HNBR

Mechanically strong and normally resistant to ozone and strong oxidizers, animal and vegetable fats, nonpolar solvents, oils and lubricants, water and aqueous solutions. The recommend max. temperature is 130°C (266°F).

### Perfluoroalkoxy polymer, PFA

PFA is very similar to PTFE, but opposite to those PFA is thermo plastic and has minimal porosity. PFA has a very high mechanical strength which makes it a perfect choice when dealing with abrasive products. The PFA seal offers longer service intervals. The recommend max. temperature for the PFA seal is 90°C (194°F).

## Rubber material and application

### Product and chemical resistance of flexible rubber materials

The information below is intended as an aid in selecting the best rubber quality for an actual application. It is not possible to state any general lifetime of rubber seals as many factors influence it: chemical attack, temperature, mechanical wear etc. Extreme temperatures, even within the generally accepted limits, may worsen other kinds of attack and thus reduce the lifetime.

### Ratings

1 = Unsuitable.

2 = Limited suitability.

3 = Normal suitability.

4 = High suitability.

- = Not recommended for other reasons.

The table contains data which have been compiled from the results of our own tests and the recommendations of our raw material suppliers. The data should be considered as recommendations only and will be brought up-to-date from time to time. They are based on constant contact with the specified product.

In case of doubt or lack of information it would be advisable to consult us directly, which will enable us to investigate specific applications.

| Product or process                                  | NBR <sup>1)</sup> | EPDM <sup>2)</sup> | Q <sup>3)</sup> | FPM <sup>4)</sup> | PTFE <sup>5)</sup> |
|---|-------------------|--------------------|-----------------|-------------------|--------------------|
| Dairy products (milk, cream)                        | 3                 | 3-4                | 3-4             | -                 | 3-4                |
| Dairy products (sour milk products)                 | 3                 | 3-4                | 3-4             | -                 | 3-4                |
| Brewery products (beer, hops etc.)                  | 3                 | 3-4                | 1-2             | 2-3               | 3-4                |
| Wine and yeast                                      | 3                 | 4                  | 4               | 2-3               | 3-4                |
| Animal and vegetable fats: 100 °C                   | 3                 | 1-2                | 3               | 4                 | 3-4                |
| Water and water solutions < 70 °C                   | 3                 | 4                  | 3               | 2-4               | 3-4                |
| Hot water and steam < 130 °C                        | 1                 | 4                  | 2               | -                 | 3-4                |
| Concentrated fruit juices and etheral oils < 100 °C | 1                 | 1                  | 1               | 3                 | 3-4                |
| Non-oxydising acids < 80 °C                         | 1-2               | 3                  | 1-2             | 2                 | 3-4                |
| Oxydising acids < 80 °C                             | -                 | 3                  | 1               | 2                 | 3-4                |
| Weak concentrate of lye < 100 °C                    | 2                 | 4                  | 2               | 2                 | 3-4                |
| Strong concentrate of lye < 100 °C                  | 1                 | 3                  | 1               | 1                 | 3-4                |
| Mineral oils < 110 °C                               | 3                 | -                  | -               | 4                 | 3-4                |
| Aliphatic carburetted hydrogen (hexane)             | 3                 | 1                  | 1               | 4                 | 3-4                |
| Aromatic carburetted hydrogen (benzole)             | 1                 | 1                  | 1               | 3                 | 3-4                |
| Alcohols  | 1-3               | 2-3                | 3-4             | 3-4               | 3-4                |
| Ester and ketones                                   | 1-2               | 1-2                | 1-2             | 3-4               | 3-4                |
| Ether   | 1                 | 1                  | 1-3             | 3-4               | 3-4                |
| Methylene chloride                                  | 1                 | 1                  | 2-3             | 3-4               | 3-4                |
| Ozone and atmospheric conditions                    | 1-2               | 4                  | 4               | 3-4               | 3-4                |

International designation of flexible rubber materials according to ISO R 1629.

ISO = International standard.

### Notes

|    | Designation of flexible rubber materials | Abbreviation symbol |
|----|--|---------------------|
| 1) | Nitrile rubber                           | N                   |
| 2) | Ethylene propylene rubber                | E                   |
| 3) | Silicone rubber                          | Q                   |
| 4) | Fluorinated rubber                       | F                   |
| 5) | Polytetraflour ethylene                  |                     |



## Pressure ratings

### EN 10357-A Tubes

#### Permissible max. Operating Pressures at a temperature of 20 °C

| Nominal diameters                                |     |     |     |     |     |     |    |    |    |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|----|----|----|-----|-----|-----|-----|
| DN   | 10  | 15  | 20  | 25  | 32  | 40  | 50 | 65 | 80 | 100 | 125 | 150 | 200 |
| Permissible operating pressures in bar for tubes |     |     |     |     |     |     |    |    |    |     |     |     |     |
|  | 355 | 242 | 200 | 159 | 131 | 112 | 87 | 87 | 72 | 59  | 47  | 39  | 30  |

The permissible operating pressures have been calculated for welded pipes with the calculation value for material number 1.4301 acc. to DIN EN 10088-2 product shape C (cold strip) taking into consideration calculation voltage of 100% in the welded seam.

#### Permissible max. Operating Pressures at a temperature of 150 °C

| Nominal diameters                                |     |     |     |    |    |    |    |    |    |     |     |     |     |
|--|-----|-----|-----|----|----|----|----|----|----|-----|-----|-----|-----|
| DN   | 10  | 15  | 20  | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 |
| Permissible operating pressures in bar for tubes |     |     |     |    |    |    |    |    |    |     |     |     |     |
|  | 219 | 150 | 124 | 98 | 81 | 69 | 53 | 54 | 44 | 36  | 29  | 24  | 18  |

#### Maximum pressure for the DIN Connections [bar]

The pressures are usable up to maximum 140 °C

| Size  | Standard |         |         |         |         |         |         |
|-------|----------|---------|---------|---------|---------|---------|---------|
|       | 11851    | 11853-1 | 11853-2 | 11853-3 | 11864-1 | 11864-2 | 11864-3 |
| DN10  |          |         |         |         |         |         |         |
| DN15  |          |         |         |         |         |         |         |
| DN20  |          |         |         |         |         |         |         |
| DN25  | 40       | 40      | 25      | 40      | 40      | 25      | 40      |
| DN32  |          |         |         |         |         |         |         |
| DN40  |          |         |         |         |         |         |         |
| DN50  |          |         |         |         |         |         |         |
| DN65  |          |         |         | 25      |         |         | 25      |
| DN80  | 25       | 25      | 16      |         | 25      | 16      |         |
| DN100 |          |         |         | 16      |         |         | 16      |
| DN125 |          |         |         |         |         |         |         |
| DN150 | 16       |         | 10      |         |         | 10      |         |

#### Maximum pressure for the Tubular Fittings [bar]

The pressures are usable up to maximum 150 °C

| Size  | DIN 11852 |       |          |
|-------|-----------|-------|----------|
|       | TEES      | BENDS | REDUCERS |
| DN10  |           |       |          |
| DN15  |           |       |          |
| DN20  |           |       |          |
| DN25  | 25        | 25    | 25       |
| DN32  |           |       |          |
| DN40  |           |       |          |
| DN50  |           |       |          |
| DN65  |           |       |          |
| DN80  | 16        | 16    | 16       |
| DN100 | 12.5      |       |          |
| DN125 | 10        |       |          |
| DN150 | 8         | 10    | 10       |
| DN200 | 5         |       |          |

For reduced Tees and Reducers the DN size refers to the largest diameter.

Pressure drop and flow velocity curves

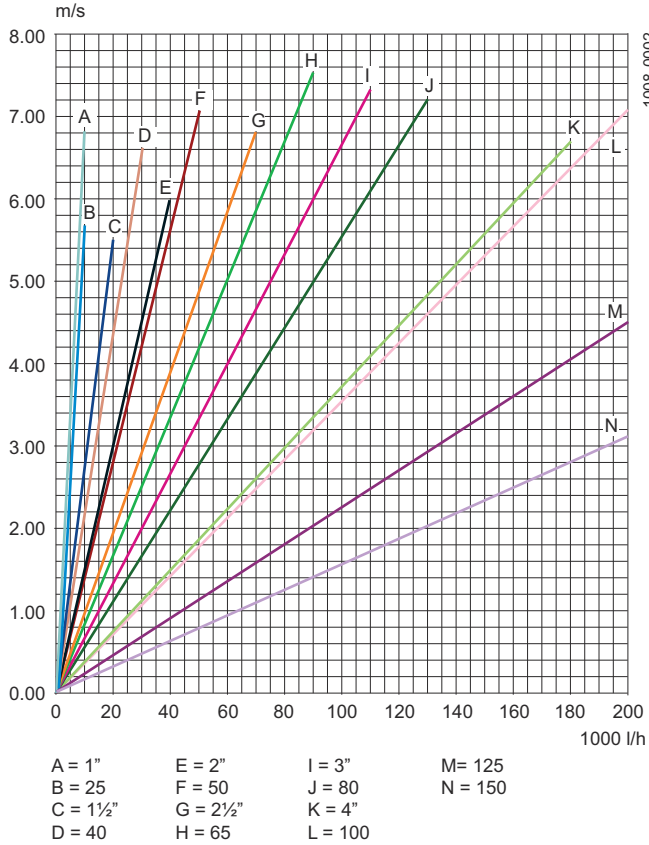


Figure 1. Flow velocity in ISO 2037 and EN 10357-A tubes

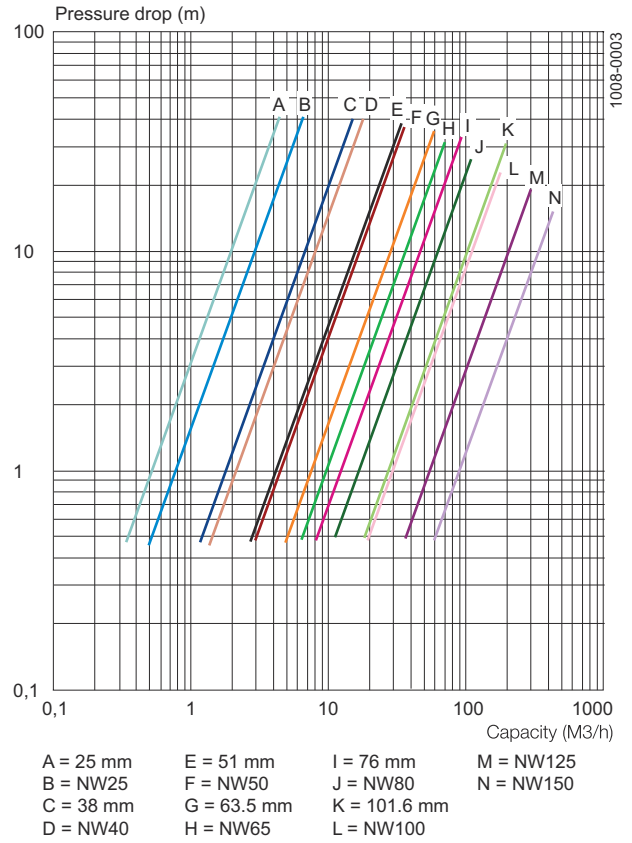


Figure 2. Pressure drop in 100 m ISO 2037 and EN 10357-A tubes

## Steelgrades

### Most common steelgrades

In the table below, we have shown the chemical composition of the materials.

| Name            | Material         | Chemical composition |        |        |       |         |         |              |            |              |
|-----------------|------------------|----------------------|--------|--------|-------|---------|---------|--------------|------------|--------------|
|                 |                  | C                    | Si     | Mn     | Pmax. | S       | N       | Cr           | Mo         | Ni           |
| X5CrNi18-10     | 1.4301<br>(304)  | ≤ 0.070              | ≤ 1.00 | ≤ 2.00 | 0.045 | ≤ 0.015 | ≤ 0.011 | 17.5 to 19.5 |            | 8.0 to 10.5  |
| X2CrNi18-9      | 1.4307<br>(304L) | ≤ 0.030              | ≤ 1.00 | ≤ 2.00 | 0.045 | ≤ 0.015 | ≤ 0.011 | 17.5 to 19.5 |            | 8.0 to 10.5  |
| X5CrNiMo17-12-2 | 1.4401<br>(316)  | ≤ 0.070              | ≤ 1.00 | ≤ 2.00 | 0.045 | ≤ 0.015 | ≤ 0.011 | 16.5 to 18.5 | 2.0 to 2.5 | 10.0 to 13.0 |
| X2CrNiMo17-12-2 | 1.4404<br>(316L) | ≤ 0.030              | ≤ 1.00 | ≤ 2.00 | 0.045 | ≤ 0.015 | ≤ 0.011 | 16.5 to 18.5 | 2.0 to 2.5 | 10.0 to 13.0 |
| X2CrNiMo18-14-3 | 1.4435<br>(316L) | ≤ 0.030              | ≤ 1.00 | ≤ 2.00 | 0.045 | ≤ 0.015 | ≤ 0.011 | 17.0 to 19.0 | 2.5 to 3.0 | 12.5 to 15.0 |

(According to EN 10088-1)

(The material names 304, 304L, 316 and 316L according to AISI/SAE)

We do not offer 1.4435, we have chosen 1.4404 instead. Both materials are designed for highly corrosive environments. Material 1.4435 has due to the higher content of Chromium and Nickel a better corrosion resistance and formability than 1.4404, it also has a significantly higher price. Our many years in the Installation Material Business has proven 1.4404 as the best match for our customers processes.

## Treatment of stainless steel

We will shortly touch two of the most important areas:

1. Heat treatment
2. Chemical surface treatment

### Heat treatment

Processes where you are heating the metal to a certain temperature, which will make the atoms migrate in the crystal lattice.

We will focus on the most important.

### Annealing

A process where the metal is heated to a temperature around 1050 ° - 1150 °C, kept there for a specific time and then cooled at a very slow and controlled rate. The process is used to:

- Reduce hardness
- Increase ductility
- Release mechanical stresses

After annealing the metal is more workable.

### Chemical surface treatment

To understand why we do surface treatments, it is important to understand the role of the passive layer.

The passive layer is a thin invisible oxide film (most important are the chromium- and iron oxides), which protects the steel from its surroundings, and therefore from corrosion. If the layer is locally broken, for example by a scratch, it will, under normal conditions (clean surface and enough oxygen), naturally self-passivate, and thereby restore the ability to avoid corrosion. Stainless steels ability to have this in-built self-repairing corrosion protection system, is what we benefit from.

In some cases, typically after reworking the steel, we need to help the steel to restore the oxide film, here the surface treatment is important. The good thing is, stainless steel treated in the right way and not exposed above its "chemical strength", will last very long. On the other side, if the "rules" working with stainless steel are not followed or the stainless steel is placed in an environment above its "chemical strength", the oxide layer will "break" and corrosion will start, once the corrosion has started it will proceed very fast.

The two most common mentioned chemical surface treatments are "Pickling" and "Passivation".

### Pickling

A process where the metal is put into an acid bath (typically 15 % Nitric acid and 3 % Hydrofluoric acid). Time and temperature of the bath is depending by the case. Pickling is used to remove weld heat tinted layers from the surface. A thin layer of metal is removed by the process and cleaning the steel, after the process the steel has totally lost its oxide film, but after flushing with water it will automatically be reestablished. It will take up to 24 hours before the layer is as robust as before the welding process.

### Passivation

When the surface is clean the passivation (reestablishing the oxide film), is happening automatically, but as discussed above it will take some time before the layer has the natural strength. This can be forced to happen very fast by a chemical passivation. The passivation bath is one type of acid (normally 20 % Nitric acid). No metal is removed from the surface and the surface roughness is not changed, only the passive layer is strengthened.

## Elastomer review

### Elastomers

Seal rings are available in EPDM, FPM and PTFE

#### Elastomer properties

|                                      | EPDM              | FPM               | PTFE              |
|--------------------------------------|-------------------|-------------------|-------------------|
| FDA (CFR 21: 177.2600)               | Yes               | Yes               | Yes               |
| USP Class VI certified               | No                | No                | No                |
| Recommended operating temperature °C | -10 °C to +140 °C | -10 °C to +180 °C | -10 °C to +220 °C |
| <b>Resistance</b>                    |                   |                   |                   |
| Steam resistance                     | Yes               | No                | Yes               |
| Alkali resistance                    | Yes               | No                | Yes               |
| Resistance to fats/oils              | No                | Yes               | Yes               |
| Ozone resistance                     | Yes               | Yes               | Yes               |

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