

# INSTRUMENTATION - connectors

## Precision pipes

Precision pipelines are used in very demanding industry sectors - in the chemical industry, petrochemical industry, power industry, nuclear power plants and process engineering. They work in high pressure conditions, vacuum, vibrations and high temperatures. It is crucial for precision pipelines to be reliable. The precision pipelines are made of high quality pipes connected by twin ferrule connectors (LET-LOK® connectors).

The pipes used in the pipelines must meet the specific requirements. The most important criteria are given below:

- the coupling and the pipe must be made of the same material, here the pipes and LET-LOK® connectors should be made of AISI 316 / AISI 316L steel. Each material features different physical properties, therefore two different materials may affect the quality of connection.
- seamless pipes should be used, compliant with the requirements of ASTM A213, ASTM A269 or similar standards.
- hardness must be lower than the hardness of material the connectors are made of and must not exceed 80 HRB;
- pipe surface should be clean from dirt, scratches, dents;
- cross-section of the pipe must be perfectly circular, oval or flattened pipes may affect the quality of connection as the pipes will not fit the coupling;
- it is recommended to use pipes with wall thickness parameters given in the tables below. If the wall is too thin, it can collapse during installation, if it is too thick, the ferrule can be mounted on the pipe incorrectly.

### Working pressure correction factor for pipes depending on temperature:

temperature	93°C	204°C	316°C	427°C	538°C	649°C
factor (AISI 316 steel)	1	0.96	0.85	0.79	0.76	0.37



### HPS type

Seamless precision pipes made of cold-rolled austenitic stainless steel.

**Material:** AISI 316L (1.4435). Dimensions and tolerances acc. to ASTM A213-AW

**Length:** 6 m (can be cut into 2 or 3 m sections) Coiled pipes are also available (coiled tube)

code	O.D. [inch]	O.D. [mm]	wall thickness [mm]	I.D. [mm]	theoretical press. [bar]		weight [kg/m]
					EN 13480-3 2012	ASME B31.3 2012	
imperial size							
HR-HPS1-01,59X0,36	1/16	1.59	0.36	0.87	694	662	0.011
HR-HPS1-01,59X0,51	1/16	1.59	0.51	0.57	1008	961	0.014
HR-HPS1-03,18X0,71	1/8	3.18	0.71	1.76	684	652	0.044
HR-HPS1-03,18X0,89	1/8	3.18	0.89	1.39	874	834	0.051
HR-HPS1-06,35X0,71	1/4	6.35	0.71	4.93	323	301	0.100
HR-HPS1-06,35X0,89	1/4	6.35	0.89	4.57	417	386	0.122
HR-HPS1-06,35X1,24	1/4	6.35	1.24	3.87	616	562	0.159
HR-HPS1-06,35X1,65	1/4	6.35	1.65	3.05	807	770	0.194
HR-HPS1-09,53X0,89	3/8	9.53	0.89	7.75	265	248	0.193
HR-HPS1-09,53X1,24	3/8	9.53	1.24	7.05	383	356	0.257
HR-HPS1-09,53X1,65	3/8	9.53	1.65	7.01	534	490	0.326
HR-HPS1-09,53X2,11	3/8	9.53	2.11	5.31	678	646	0.391
HR-HPS1-12,7X0,89	1/2	12.70	0.89	10.92	194	183	0.263
HR-HPS1-12,7X1,24	1/2	12.70	1.24	10.22	278	260	0.356
HR-HPS1-12,7X1,65	1/2	12.70	1.65	9.40	383	355	0.456

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## Precision pipes - HPS type (table follow up)

code	O.D. [inch]	O.D. [mm]	wall thickness [mm]	I.D. [mm]	theoretical press. [bar]		weight [kg/m]
					EN 13480-3 2012	ASME B31.3 2012	
imperial size							
HR-HPS1-12,7X2,11	1/2	12.70	2.11	8.48	508	468	0.559
HR-HPS1-15,88X1,22	5/8	15.88	1.22	13.44	214	201	0.448
HR-HPS1-15,88X1,65	5/8	15.88	1.65	12.58	298	278	0.588
HR-HPS1-19,05X1,24	3/4	19.05	1.24	16.57	180	169	0.553
HR-HPS1-19,05X1,65	3/4	19.05	1.65	15.75	244	229	0.718
HR-HPS1-19,05X2,11	3/4	19.05	2.11	14.83	320	298	0.895
HR-HPS1-19,05X2,77	3/4	19.05	2.77	13.51	435	403	1.130
HR-HPS1-25,4X1,24	1	25.4	1.24	22.92	132	125	0.750
HR-HPS1-25,4X1,65	1	25.4	1.65	22.10	179	169	0.981
HR-HPS1-25,4X2,11	1	25.4	2.11	21.18	233	219	1.230
HR-HPS1-25,4X3,2	1	25.40	3.20	19.00	370	343	1.780
metric size							
HR-HPS-03X0,7	-	3	0.7	1.6	718	684	0.04
HR-HPS-06X1,0	-	6	1	4	510	470	0.13
HR-HPS-06X1,5	-	6	1.5	3	774	738	0.17
HR-HPS-08X1,0	-	8	1	6	366	340	0.18
HR-HPS-08X1,5	-	8	1.5	5	587	537	0.24
HR-HPS-08X2,0	-	8	2	4	635	577	0.30
HR-HPS-10X1,0	-	10	1	8	286	267	0.23
HR-HPS-10X1,5	-	10	1.5	7	451	417	0.32
HR-HPS-10X2,0	-	10	2.0	6	635	577	0.40
HR-HPS-12X1,0	-	12	1	10	234	220	0.28
HR-HPS-12X1,5	-	12	1.5	9	366	340	0.39
HR-HPS-12X2,0	-	12	2.0	8	510	470	0.50
HR-HPS-14X2,0	-	14	2.0	10	426	395	0.60
HR-HPS-15X1,5	-	15	1.5	12	286	267	0.51
HR-HPS-15X2,0	-	15	2.0	11	394	366	0.65
HR-HPS-16X1,0	-	16	1.0	14	172	162	0.38
HR-HPS-16X2,0	-	16	2.0	12	366	340	0.70
HR-HPS-18X1,5	-	18	1.5	15	234	220	0.62
HR-HPS-18X2,0	-	18	2.0	14	321	299	0.80
HR-HPS-20X1,5	-	20	1.5	17	209	196	0.69
HR-HPS-20X2,0	-	20	2.0	16	286	267	0.90
HR-HPS-20X2,5	-	20	2.5	15	366	340	1.06
HR-HPS-25X2,0	-	25	2.0	21	224	210	1.15
HR-HPS-25X2,5	-	25	2.5	20	286	267	1.41
HR-HPS-25X3,0	-	25	3.0	19	350	326	1.65