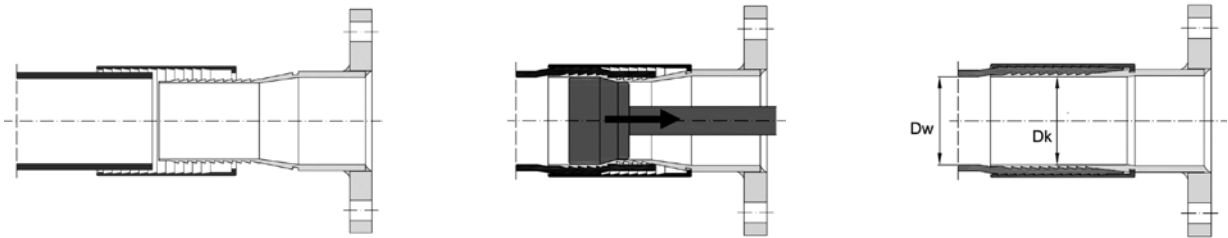


# INDUSTRIAL FITTINGS - couplings

## Fittings for internal swaging

An internal swaging system was developed to provide permanent and safe fitting-hose connection. It ensures full and unrestricted flow through the fitting of a flexible hose assembly. The system utilizes a cold forming method - a mechanical method of fitting attachment. The key part of the system is a hardened, cone shaped swaging tool. The diameter of the tool in its widest, working part is slightly bigger than the internal diameter of the fitting before crimping. The tool is pulled down the inside of the fitting so it expands to a desired diameter. The tail of the fitting compresses the hose against the ferrule. The internal swaging is opposite to traditional external crimping of ferrules as far as the process itself is concerned. The connection is achieved from the inside outwards, yet on the outside.



The main advantage of internal swaging over external crimping is the increase in a flow rate, because:

- when externally crimped, the hose tail of a fitting (inserted into the hose) reduces the flow diameter by the thickness of its wall;
- when internally swaged, the wall of the hose tail is entirely pushed into the hose. The inside flow diameters of both the hose and its fitting are the same  $D_w = D_k$ .

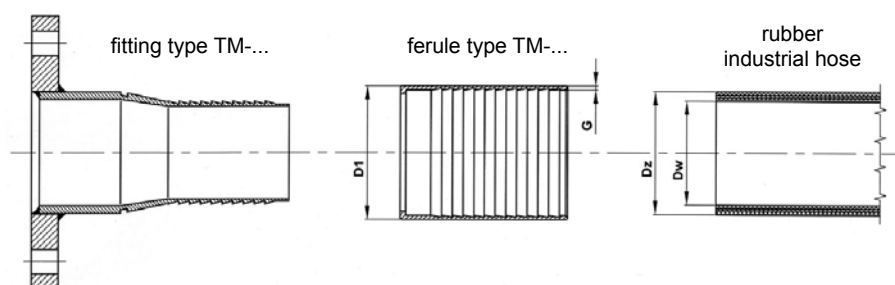
Example for DN76 (3") hose, when the flow rate through the fitting amounts to  $w = 4$  m/s.

x	Dk [mm]	area S [cm <sup>2</sup> ]	flow rate Q [l/min]
external crimping	70.5	39	936
internal crimping	76	45.3	1088
gain (external / internal)	+7.8%	+16%	+16%

The bigger the flow rate, the shorter the reloading time - that makes the internal swaging method really cost-effective. Another advantage is the lack of obstacles and no turbulence at the tip of a hose tail which is crucial for the transfer of dry and loose or semi-fluid products (granules, grain, cement, concrete, etc.). The internal swaging system can be used for the majority of rubber industrial hoses from 2" (DN50) to 12" (DN300). It is particularly recommended for water and air hoses, fuels and other petrochemical products, delivery hoses for solids and for foodstuffs.

### Fitting and ferrule selection

Internal swaging requires special fittings and ferrules (TM type). The ferrule is selected according to hose DN and its external diameter Dz (see picture below). Assemble in accordance with IT-86 manual. The maximum working pressure for internally swaged fittings is 20 bar. The maximum working pressure of the complete flexible hose assembly is also limited by the working pressure of connections (e.g. PN 16 flange) and by the working pressure of the hose.



# INDUSTRIAL FITTINGS - couplings

## Fittings for internal swaging

### Fittings

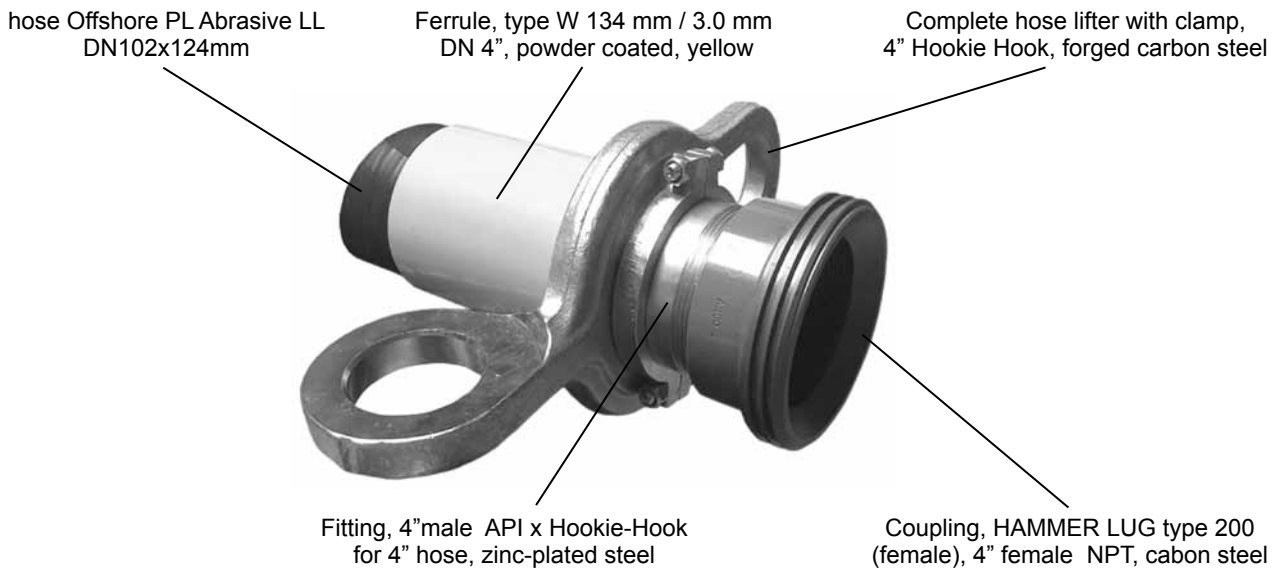
Material: galvanized carbon steel (for TM-KS-... - without galvanizing); AISI 316 stainless steel (add SS to a code). Maximum working pressure: 20 bar. The maximum working pressure of a complete flexible hose assembly is additionally limited by the working pressure of the connector (e.g. PN16 flange) and the working pressure of the hose.

fittings with male thread					weld-in fittings		PN 16 flanges		
hose DN [mm]	thread [inch]	BSP code	BSPT code	API / NPT code	d [mm]	code	DN [mm]	fixed flange code	swivel flange code
50	2	TM-KZBP-050	TM-KZBT-050	TM-KZNT-050	60.3	TM-KS-050	50	TM-KKS-050	TM-KKO-050
65	2.1/2	TM-KZBP-065	TM-KZBT-065	TM-KZNT-065	76.1	TM-KS-065	65	TM-KKS-065	TM-KKO-065
75	3	TM-KZBP-075	TM-KZBT-075	TM-KZNT-075	88.9	TM-KS-075	75	TM-KKS-075	TM-KKO-075
80	3	TM-KZBP-080	TM-KZBT-080	TM-KZNT-080	88.9	TM-KS-080	80	TM-KKS-080	TM-KKO-080
100	4	TM-KZBP-100	TM-KZBT-100	TM-KZNT-100	114.3	TM-KS-100	100	TM-KKS-100	TM-KKO-100
125	5	TM-KZBP-125	TM-KZBT-125	TM-KZNT-125	139.7	TM-KS-125	125	TM-KKS-125	TM-KKO-125
150	6	TM-KZBP-150	TM-KZBT-150	TM-KZNT-150	168.3	TM-KS-150	150	TM-KKS-150	TM-KKO-150
200	8	TM-KZBP-200	TM-KZBT-200	TM-KZNT-200	219.1	TM-KS-200	200	TM-KKS-200	TM-KKO-200

ASA 150 and ASA 300 flange fittings (in accordance with American ANSI B16.5 standard), groove fittings and fittings of a „Hookie-Hook” type (with space to accommodate a hose lifter) with API male thread for off-shore application are also available.

### Example of internally swaged fitting

Hose assembly ABRASIVE/LL DN102, total length 45 m, with female thread fittings according to API (NPT) specification with Hookie Hook type hose lifter.



Because a ferrule is not mechanically deformed in the internal swaging process and powder coating finish on top of the ferrule is undamaged, a colour coding system can be easily introduced.

The colour coding system for industrial hoses, especially for offshore application is recommended by Oil & Gas UK (formerly UKOOA - United Kingdom Offshore Operators Association).

# INDUSTRIAL FITTINGS - couplings

## Fittings for internal crimping

### Ferrules

Material: galvanized carbon steel, AISI 304 steel (code example: TM-W-025-035-SS).

hose O.D. [mm]	hose nominal diameter				
	DN25 1"	DN32 1.1/4"	DN40 1.1/2"	DN50 2"	DN65 2.1/2"
35÷36.5	TM-W-025-035	-	-	-	-
37÷38.5	TM-W-025-037	-	-	-	-
39÷40.5	TM-W-025-039	TM-W-032-039	-	-	-
41÷42.5	-	TM-W-032-041	-	-	-
43÷44.5	-	TM-W-032-043	-	-	-
45÷46.5	-	TM-W-032-045	-	-	-
47÷48.5	-	TM-W-032-047	TM-W-040-047	-	-
49÷50.5	-	-	TM-W-040-049	-	-
51÷52.5	-	-	TM-W-040-051	-	-
53÷54.5	-	-	TM-W-040-053	-	-
55÷56.5	-	-	TM-W-040-055	-	-
57÷58.5	-	-	TM-W-040-057	-	-
63÷64.5	-	-	-	TM-W-050-063	-
65÷66.5	-	-	-	TM-W-050-065	-
67÷68.5	-	-	-	TM-W-050-067	-
69÷70.5	-	-	-	TM-W-050-069	-
71÷72.5	-	-	-	TM-W-050-071	-
73÷74.5	-	-	-	TM-W-050-073	-
75÷76.5	-	-	-	TM-W-050-075	TM-W-065-075
77÷78.5	-	-	-	-	TM-W-065-077
79÷80.5	-	-	-	-	TM-W-065-079
81÷82.5	-	-	-	-	TM-W-065-081
83÷84.5	-	-	-	-	TM-W-065-083
85÷86.5	-	-	-	-	TM-W-065-085

hose O.D. [mm]	hose nominal diameter				
	DN80 3"	DN100 4"	DN125 5"	DN150 6"	DN200 8"
88÷90	TM-W-080-088	-	-	-	-
90.5÷92.5	TM-W-080-090	-	-	-	-
93÷95	TM-W-080-093	-	-	-	-
95.5÷97.5	TM-W-080-095	-	-	-	-
98÷100	TM-W-080-098	-	-	-	-
116÷118.5	-	TM-W-100-116	-	-	-
119÷121.5	-	TM-W-100-119	-	-	-
122÷124.5	-	TM-W-100-122	-	-	-
125÷127.5	-	TM-W-100-125	-	-	-
128÷129.5	-	TM-W-100-128	-	-	-
142÷144.5	-	-	TM-W-125-142	-	-
146÷148.5	-	-	TM-W-125-146	-	-
149÷151.5	-	-	TM-W-125-149	-	-
152÷154.5	-	-	TM-W-125-152	-	-
155÷157.5	-	-	TM-W-125-155	-	-
168÷170.5	-	-	-	TM-W-150-168	-
171÷173.5	-	-	-	TM-W-150-171	-
174÷176.5	-	-	-	TM-W-150-174	-
177÷179.5	-	-	-	TM-W-150-177	-
180÷182.5	-	-	-	TM-W-150-180	-
223÷225.5	-	-	-	-	TM-W-200-223
226÷228.5	-	-	-	-	TM-W-200-226
229÷231.5	-	-	-	-	TM-W-200-229
232÷236.5	-	-	-	-	TM-W-200-232