

CEGA®

Catalogue



Innovative shrink
products, tubes
and accessories

LIST OF CONTENTS

1. General information	5
2. Quality	5
3. Specification of products and goods	7
3.1 Parameters	7
3.2 Row materials	7
3.3 Sealing	7
3.4 Radiation cross-linking	8
4. Packaging	8
5. Transport and storage	8
6. Assembly	9
6.1 The skewing on the welded joints in pre-insulated pipelines. Assembling of CEGA's insulation joints made of HDPE	10
7. Service and training	10
8. Product catalogue	10
8.1 Insulating joints and sleeves	10
8.1.1 Proper fitting joints to the opened junction space	10
8.1.2a Dimensions of HDPE sleeves used for the production of heat shrinkable joints	11
8.1.2b Dimensions of HDPE sleeves used for production of heat shrinkable joints covering two adjacent diameters (double expanded)	11
8.1.3 MTX2 heat shrinkable radiation cross-linked joints with mastic and hot melt adhesive, straight, shrinkable along its entire length	12
8.1.4 MTX2 cross-linked heat shrinkable joints with mastic and hot-melt adhesive. Bell-ended joints, shrinkable on their entire length.	13
8.1.5 MT heat shrinkable joints	14
8.1.6 MTr heat-shrinkable joints covering two adjacent diameters (double expanded), straight shaped	15
8.1.7a MTM heat shrinkable joints with mastic	16
8.1.7b MTM+ heat shrinkable joints with mastic and hot melt adhesive	17
8.1.7c MTMan heat shrinkable joints with mastic, flame retardant with antistatic layer.	18
8.1.8 MTO1 heat shrinkable joints with mastic and extra sealing by shrinkable cross-linked collars (double sealing).	19
8.1.9 MTF1 cross-linked flexible elbow joints with shrinkable ends (Flexbend 0-90°)	20
8.1.10 Steel bends to flexible elbow joints (Flexbends)	21
8.1.11 MEZ electro-fusion welding, sliding (closed) heat shrinkable joints (to be shrunk prior to welding)	22
8.1.12 EG40 heating elements to MEZ, electro-fusion welding, heat shrinkable joints	23
8.1.13 MEP open (plate type) electro-fusion welding joints	24
8.1.14 MTK1 heat-shrinkable end-joints with mastic	25
8.1.15 MP sliding sleeves	26
8.2 CEGA jacket pipes for pre-insulation	27
8.2.1 CEGA jacket pipes for pre-insulation made of high quality polyethylene acc. to PN-EN253:2020-01, with corona treatment	27
8.2.2 CEGA PE-UV jacket pipes for pre-insulation made of high quality polyethylene acc. to PN-EN253:2020-01, UV resistant, with corona treatment	28
8.2.3 CEGA PE-AS jacket pipes for pre-insulation made of high quality polyethylene acc. to PN-EN253:2020-01, antistatic	29
8.2.4 CEGA PE-NP/AS jacket pipes for pre-insulation made of high quality polyethylene acc. to PN-EN253:2020-01, flame retardant, antistatic	30
8.2.5 CEGA two-layers jacket pipes for pre-insulation with white outer layer made of high quality polyethylene acc. to PN-EN253:2020-01, with corona treatment	31
8.3 TRPE main pipe (HDPE) with collar	32
8.4 Shrinkable reductions	34
8.4.1 Shrinkable reductions MTMr (straight shaped) and MTMrw bottle shaped (with welding), with mastic.	34

8.4.2	Shrinkable reductions MTX2r (straight shaped) and MTX2rw bottle shaped (with welding), radiation cross-linked, with mastic and hot melt adhesive	35
8.5	EC heat shrinkable end caps made of cross-linked polyolefin	36
8.5.1	ECS1 heat shrinkable cross-linked end-caps, with mastic, for single pipes	36
8.5.2	ECD1 heat shrinkable, cross-linked end-caps, with mastic, for double, symmetric pipes	37
8.5.3	ECS1-Z heat shrinkable, cross-linked end-caps, with mastic, for valves	38
8.5.4	ECZ1 heat shrinkable, cross-linked, dividable (open) end caps, glass-fiber reinforced, with zipper for single pipes	39
8.6	UNI-sleeves radiation cross-linked wrap-around heat shrinkable RJS-E tape coated with hot melt adhesive strip and visco-elastic sealant, pre-cut to length, with pre-attached WPCP closure patch	40
8.7	TPSM-PE heat shrinkable, cross-linked collars with mastic	41
8.8	NTX3 radiation cross-linked, heat shrinkable sleeves with hot melt adhesive	42
8.9	PUR foam	43
8.9.1	PUR CEGA foam-bags and foam-kits (bottled)	43
8.9.2	Proper selection of PUR – MTM heat shrinkable joints, MTX2 heat shrinkable radiation cross-linked joints, MEZ electro-fusion welding, sliding (closed) joints.	44
8.9.3	Proper selection of PUR – flexible elbow joints with shrinkable ends (Flexbends)	46
8.9.4	Proper selection of PUR – MEP and Ewelcon open (plate type) electro-fusion welding	47
8.9.5	Proper selection of PUR to duo pipes – MTM heat shrinkable joints, MTX2 heat shrinkable radiation cross-linked joints	48
9.	Goods and accessories	49
9.1	PUG sealing rubber rings (wall bush)	49
9.2	RJS-E heat shrinkable, cross-linked tape.	49
9.3	WPCP closure patches	50
9.4	Butyl mastic M.	50
9.5.	FOPS patches protecting from infiltration of humidity	50
9.6	HDPE wire for welding.	50
9.7	HDPE plugs for heat shrinkable and electro fusion welding joints.	51
9.8	Cutter for drilling the foaming openings	51
9.9	Holder for welding plugs	51
9.10	Welder unit to welding plugs	51
9.11	ZPCD Pressure test set (large one)	52
9.12	An isopropanol alcohol for cleaning the surface of the jacket pipe	52
9.13	Dust-free cleaning tissues	52
9.14	DM copper wire and DMC tin-coated copper wire, diameter 1,39mm	53
9.15	PDA bracket (support) to alarm wire	53
9.16	Brandes set	53
9.17	ZDA connector to 1,39 alarm wire	53
9.18	Fixing tape to PDA brackets	53
9.19	An alarm wire outlet	53
9.20	CEG1 (3k3P) electro-fusion welding unit for MEZ sliding (closed) shrinkable joints	54
9.21	CEG2 (2k8P-I) electro-fusion welding, universal unit to MEZ sliding and MEP open (plate type) joints	54
10.	Specialized pressure pipes	55
10.1	HDPE100 CEGA pressure pipes PE-AS type, antistatic	55
10.2	HDPE100 CEGA pressure pipe PE-NP/AS, flame retardant, antistatic	56
10.2.1	HDPE100 CEGA pressure pipes for sewage, black, black with green longitudinal strips, or 2-layers HDPE100 RC with green outer layer	57
10.2.2	HDPE100 CEGA pressure pipes for drinking water supply, black with blue longitudinal strips, or 2-layers HDPE100 RC with blue outer layer	58

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New plant located in Lublin.



1. General information

CEGA Spółka z o. o. founded in 2007 is a leading manufacturer of heat-shrinkable cross-linked and other heat-shrinkable joints made of high-density polyethylene in the diameter range of 75-1400 mm; and many other products for the district heating & cooling, power supply and industrial sector. Its innovative products are patent protected according to resolution No.220249 of the Patent Office of the Republic of Poland. In addition, CEGA specializes in the production of plastic pipes and sleeves in the diameter range of 75-1200 mm, made of high density polyethylene PE80, PE100 and PE100 RC class.

CEGA owns a modern production plant with an area above 10.000 m² located on the site of the former Truck Factory (FSC) in Lublin, where the company's office is also located. The company moved to the new facilities after the completion of adaptation and finishing works in July 2022. **CEGA's** current technical capability is ca. 8.500 Tons of polyethylene pipe-extrusion per annum, ca. 250.000 pieces of joints and ca. 500.000 pieces of other shrinkable products (end-caps, collars, uni-sleeves, etc.).

CEGA is formed by its people, the shareholders, management and employees as well as cooperating parties. All these people are with well background and high qualifications, over 30 years long and wide experience in plastic processing, supported by customer orientation, cooperation network and business honesty makes an unique combination allowing to attract customers in Poland and other countries within European Union, as well as from outside EU, located on different continents.

2. Quality

High quality of CEGA's products origins from several different factors, such as:

- modern, innovative technology and production machinery,
- usage only high quality raw materials, delivered by members of the "PE100+ Association":

Borealis Group,

- INEOS Olefins & Polymers,
- LyondellBassell (NYSE:LYB)
- Sabic (Saudi Basic Industries Corporation)

and other components:

- mastic,
- adhesives, etc.
- quality control on every stage of production,
- 30 years of experience in manufacturing plastic products (extrusion pipes and films, injection, thermoforming, sleeves, printing and labelling),
- experience in usage and development of the heat-shrinkable products,
- highest qualifications of both management and the Staff.



Testing of the thermal stability index (OIT) at CEGA's lab.



CEGA runs its own laboratory that performs tests of manufactured plastic products and keeps control over ensuring their high quality.

For this purpose, a number of tests are used to be performed, such as:

- analysis of the content of volatile substances in the raw materials used for the production
- examination of longitudinal and transverse shrinkage of the products
- examination of the factual dimensions of products using micrometers, callipers, circometers and a microscope.

- control in the digestorium of the degree of cross-linking of products (a gel content)
- testing with DSC Differential Scanning Calorimeter of the softening temperature, onset temperature of plastic thermal degradation
- testing with DSC of thermal stability, oxidation induction time OIT, both for raw material and product



Testing of product's degree of cross-linking in the digestorium (gel content test).



The measurement of the joint's diameter shortly after its thermal expanding.

The condition for obtaining a certain long-term strength of a heat-shrinkable joint or a jacket of a pre-insulated pipe is the use of high quality polyethylene and its proper processing in the production process. In particular, during the process of pipe extrusion, thermal expansion of joints or radiation cross-linking, there is a risk of thermal oxidation of the pipe layer and degradation of polyethylene, which makes it necessary to conduct continuous quality control of products by the manufacturer.

Therefore, cyclic thermal stability testing of joints, jackets of pre-insulated pipes or pressure pipes is particularly important. Reduced technical parameters of products always mean limitation of their life-span and may cause potential failures.

3. Specification of products and goods

3.1 Parameters

Heat shrinkable, radiation cross-linked joints MTX2 produced by CEGA is the only product on the market meeting below key issues:

- full material compliance with requirements of the PN-EN 253:2020-01 standard, as it is made of PE100 class row material,
- the average radiation cross-linking level above **40%**
- joint's shape identical to the jacket pipe shape of the pre-insulated pipe (no calyx and necking nor creases)
- no need to center the joints during its shrinking (using chocks for instance), as the result of the innovative technology, enabling regular distribution of the strains on the entire product's surface,
- range of manufactured diameters: from 90 to 1400 mm,
- 100 cycles resistance in sand-box test, as per PN-EN 489:2020-01 even without the hot-melt adhesive,
- 1000 cycles resistance in sand-box test, as per PN-EN 489:2020-01 method with the hot-melt adhesive



The pictures show the lack of any deformation of MTX2 joints after 1000 cycles in a sand box test (soil stress test) in the accredited HTC Veolia laboratory in Warsaw.

High shrinking speed of MTX2 joints, compared to other solutions available on the market, resulting in time savings on the building site and the possibility to shrink them on their whole length allowing their usage together with insulating PUR shells or their cutting to desired length – e.g. in case of atypical connections near elbow connectors or tee-joints. Many years of experience show that MTX2 joints are extremely assembly-friendly and also very resistant to errors of installers.

3.2 Row materials

PN-EN 253:2020-01 standard sets up the material requirements for jacket pipe of the pre-insulated pipe unambiguously as PE80 or PE100 class polyethylene. It's an extremely important element of the pipeline that secures appropriate stability of operation over long periods of time, thermal, mechanical, UV and light resistance, as well as its good welding ability, both during assembly and possible repairs. Thus it becomes necessary to use similar materials also for isolating joints and other elements of the district heating pipeline. This is the strategy CEGA adopted at the beginning of its activity, to use for production only bimodal third generation PE100 class polyethylene, 100% compliant with the requirements of the above standard. In the result of the special bimodal

process the PE100 materials prove themselves well balanced properties going beyond those achieved by classic process. During polymerization process of the ethylene's monomer the comonomer is added, to influence on crystallinity and thanks to that also on the rigidity, shock and stress cracking resistance of polyethylene.

Properties of the material used to produce CEGA joints:

Black, bimodal, high density polyethylene (HDPE) of the following properties:

- material class: PE100,
- density: 956 to 962 kg/m³,
- melt flow index MFR 0.2 to 0.5 g/10min.,
- thermal stability (OIT) above 20 min.

Properties of the HDPE sleeve that the heat-shrinkable joint is made from, are as following:

- external diameters of sleeves, wall thickness and tolerances pursuant to PN-EN 253:2020-01 or customer specs,
- stress at the limits of plasticity at elongation of 6~12% of at least 20N/mm² (usually 22-24 N/mm²)
- elongation at break in range of 400 to 600%,
- longitudinal shrinking of no more than 3%,
- cracking resistance (curb action at constant load) – minimum 300h at temperature of 80°C and load of 4N/mm²,
- resistance to low temperatures,
- resistance to corrosion,
- environmentally friendly in manufacture and disposal, recyclable

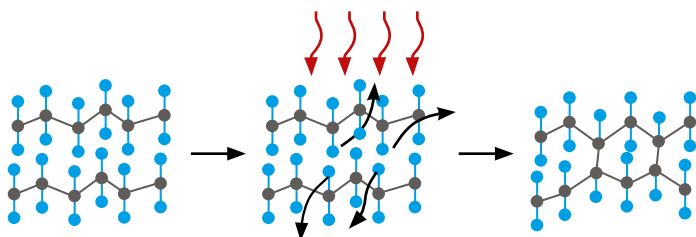
3.3 Sealing

Long time may pass from the moment the joint is manufactured till its installation. It's practically impossible to forecast how long the joint will wait for its assembly. Some of manufacturers set up the expiry dates, setting the latest date for installation. Main reason behind this is the usage of improper hot-melt adhesive and sealing materials, that are susceptible for oxidation or absorb humidity from atmosphere, degrading over the time. Therefore at the end if the joint is installed after the expiry date, there is no certainty of quality of such connection, and the statistics show, that these are usually the spots that are crucial for the lifespan of the whole pre-insulated pipeline.

This makes the **CEGA** heat shrinkable, radiation cross-linking joints with sealing designed for over 30 year lifespan fully reflect modern design requirements for pre-insulated pipelines. The hot-melt adhesive is applied in the middle section of internal surface of product to increase the resistance to breaking off the base of the joint. The mastic is placed at its edges to tightly fill all uneven surfaces and preserve elasticity of the whole connection. Mastic used in **CEGA** products has also the property of self-vulcanization.

3.4 Radiation cross-linking

Electron radiation is used in the process of industrial cross-linking of polyethylene. The beam of accelerated electrons from the accelerator, while passing through the material, loses some of their energy in elastic collisions with polymer particles. The effect of this is the production of heat, hydrogen and small volumes of hydrocarbons in the material. It is so, as the hydrogen atoms are bounced off the polymer particles through relatively low number of electrons. In the result the chemically active radical: $RH \rightarrow R^\bullet + H^\bullet$ is produced. If two radicals from different particles are in vicinity of each other a cross-link: $R^\bullet + R^\bullet \rightarrow R-R$ is formed. In this way a network made of polymer chains is made, causing the polymer to cease to be thermo-plastic.



In practice, especially in case of polyethylene, this leads to production of material, that is characterized by a range of unique properties, such as the enhanced shape-memory effect, as well as resistance to heat and chemicals.

The phenomenon of shape memory is based on the fact that a spatial grid is created. When a material containing that grid is deformed at an appropriately higher temperature, strains are created in the grid that are then “frozen” by quick cooling, and thus are not vanishing after the force is no longer applied. Later heating causes the “frozen” strains to return the material to its previous shape. This mechanism of “shape memory” forms the basis for development of heat-shrinkable product technologies, and especially for the setting of parameters of the orientation process, such as temperature, time and the dimensions of material deformation. The orientation process determines the shrinking capabilities of the material. The requirements in this aspect are the numerically defined shrink values, as expressed by percentage of sizes obtained prior to heating and after cooling down of products. In praxis if the product was placed over another one prior to shrinking, during its shrinking it fits its shape to the base, provided that the shrink value was sufficient.

4. Packaging.

For the sake of the environment protection CEGA follows the rule: „as much as necessary, but on the other hand as less as acceptable“.

Therefore the packing means are used only whereas they fulfill their function necessary for technology, for instance the protective foil for mastic strips, or white wrapping foil of the joints against splotching and/or solar radiation.

5. Transport and storage

Heat-shrinkable products such as joints, sleeves, collars, tapes, end-caps and other accessories, are to be stored in dry room protected from frost and direct sunlight. Joints and sleeves shall be stored and transported in upright position to avoid their ovalization.

What is also recommended is that the temperature in the room that all materials, together with PUR foam components are stored, is kept in the range of 15°-25°C.



The PUR foam is supplied in two alternative types of packaging, i.e. multilayer foam-bags with an anti-diffusion barrier or in bottles in pairs.

The PUR foam-bags contain a set of two liquids separated from each other components (polyol A and isocyanate B) and is distributed in insulating polystyrene boxes.

In case of PUR foam in bottles, each component is delivered separately. Component A polyol (light colour) and component B isocyanate (dark colour) are packed in polyethylene bottles or canisters with a capacity of: 0.25; 0.5; 1.0; 2.0; 5.0 or 10 L.

The PUR foam-bags or bottles may be opened under appropriate conditions and just before use.

At temperatures below 0°C, the phenomenon of crystallization of PUR foam components occurs. Frozen or crystallized components are unusable.

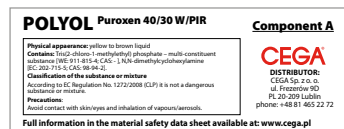
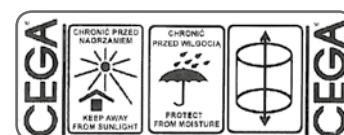
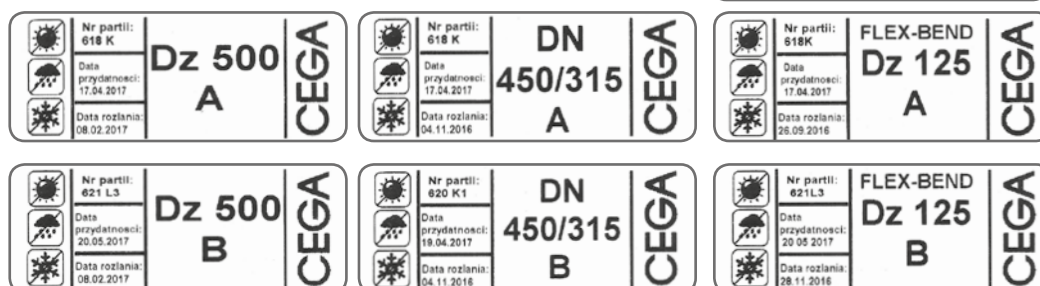
The storage conditions of joints and PUR foam components also apply to storage on the construction site.



Products' labels



Labels on the PUR components



6. Assembly

In order to proper installation of joints, sleeves or tapes it is recommended to read carefully and follow all assembly instructions of CEGA and use all the required materials and devices such as:

- a product that fits to the diameter of pre-insulated pipe,
- a cordless drill or drill-driver with a Ø24,5 mm cutter,



- a welder for weldable plugs,



- a hammer for spiking of the ventilation plugs,

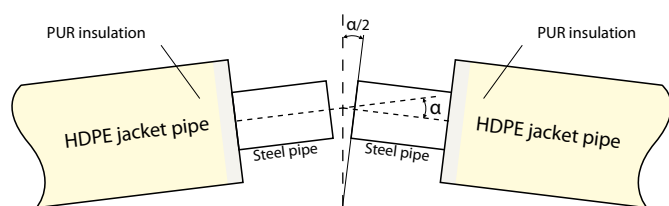
- BN40 propane-butane (or similar) gas burner for diameters of 90-315 and BN60 for larger diameters, gas canister, pressure adjuster, connecting hose.
- an abrasive cloth (60-80 grit),

- a cleaner (acetone or over 90% pure ethyl alcohol) and cloth (wipes),
- protective gloves and glasses,
- additional H&S equipment as required by regulations in place,
- umbrella or tent during precipitation,



- other required equipment and devices.

6.1 The skewing on the welded joints in pre-insulated pipelines. Assembling of CEGA's insulation joints made of HDPE.



Applying of the skewing on the welded joints causes local strain accumulation and jeopardize proper assembling of the insulation joints, therefore CEGA strongly advises precaution in its applying.

The skewing on the welded joints in practice is acceptable in any of the pipeline installation method, however with an inflection angle $\alpha \leq 3^\circ$ and minimum distance 6m.

In the pre-insulated pipelines the maximum acceptable inflection angle is limited additionally by the technology of HDPE joints, and therefore this deflection angle bigger than 3° is not recommended.

In case of need to deviate the course of the pre-insulated pipelinetion by the skewing on the welded joints the following rules shall be kept:

- The inflection angle shall be equally distributed on both sides of the welded pipelines
- The deviation of the pipeline course by the skewing on the welded joint is to be determined by the project designer
- The maximal deviations of the pipeline course by the skewing are dependent on the steel pipes diameter and shall not

exceed 3° . The value of deviation is in practice determined by respective local operators in their „Technical and exploitation guidelines for designing and installation of the pre-insulated pipelines“ or directly in the execution projects.

7. Service and training

CEGA secures sales and post sales services for the whole range of its products. We also offer trainings for sales representatives, contractors, installers, supervising inspectors and quality controllers both in the scope of products, and their transport, storage or assembly.

Please keep in mind that for proper installation of the joints appropriate experience is required. It is thus recommended for all installers to be trained by **CEGA** serviceman.

8. Product catalogue

8.1 Insulating joints and sleeves

CEGA offers three basic types of insulating joints to be chosen depending on project requirements, range of used diameters, soil conditions, costs of maintenance and other, investor-imposed criteria:

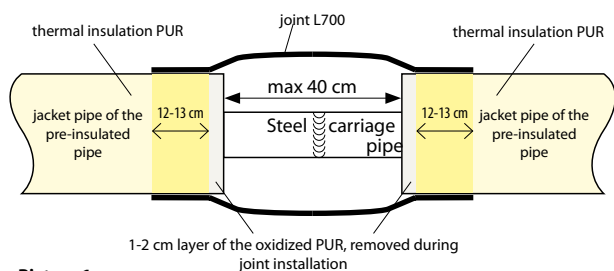
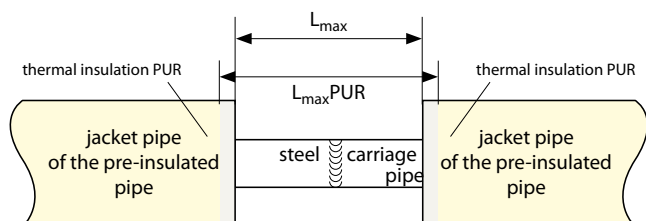
- heat-shrinkable joints, radiated cross-linked
- heat-shrinkable joints, non cross-linked
- open (plate type) or sliding (closed) joints electro-fusion welding

All types of insulating joints fulfill requirements of: PN-EN 489:2020-01 and PN-EN 253:2020-01.

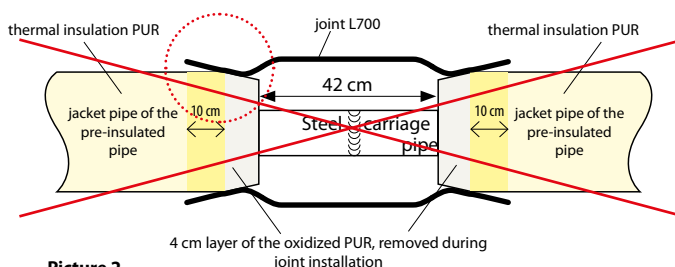
8.1.1 Dimensions of HDPE sleeves and heat shrinkable joints

The recommended maximal distance between the ends of the jacket pipes (L_{max}) and fronts of PUR (L_{max}^{PUR}) in the junction is as following:

- joint L700 - $L_{max} = 40 \text{ cm}$ / $L_{max}^{PUR} = 44 \text{ cm}$,
- joint L600 - $L_{max} = 30 \text{ cm}$ / $L_{max}^{PUR} = 34 \text{ cm}$,
- joint L500 - $L_{max} = 20 \text{ cm}$ / $L_{max}^{PUR} = 24 \text{ cm}$,



Picture 1



Picture 2

The joint shall be shrunk along 12-13 cm distance from its both edges, so the shrunk area shall be fully staked up on the jacket pipe of the pre-insulated pipe. Moreover, what is very important this jacket pipe shall be backed up by the PUR foam on the entire distance of the shrunk part of the junction (see pic. 1).

The heat-shrinkable joint shall not be shrunk on the jacket pipe of pre-insulated pipe, under which the PUR foam was removed, as high shrinking force will cause deformation of the jacket pipe along this un-supported part. This can lead to so called "saddle effect" and in consequence to incorrect placing of the joints at its edges (see pic. 2).

8.1.2a Dimensions of HDPE sleeves and heat shrinkable joints

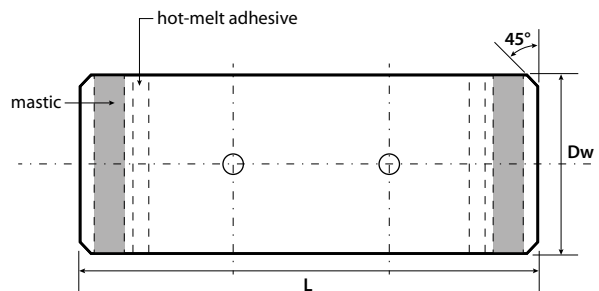
HDPE100 SLEEVE Diameter x wall thickness [mm]	NOMINAL DIAMETER OF THE JOINT DN: [mm]	JACKET PIPE, for which the joint is dedicated D _{ext} : [mm]
88x3,2	90	90x3,0
107x3,2	110	110x3,0
122x3,2	125	125x3,0
138x3,2	140	140x3,0
154x3,2	160	160x3,0
176x3,2	180	180x3,0
196x3,4	200	200x3,2
216x3,6	225	225x3,4
243x3,9	250	250x3,6
270x4,1	280	280x3,9
299x4,5	315	315x4,1
339x4,8	355	355x4,5
378x5,2	400	400x4,8
426x5,6	450	450x5,2
480x6,2	500	500x5,6
480x6,2	520	520x5,8
500x7,6	560	560x6,0
560x8,6	630	630x6,6
630x8,6	670	670x6,9
630x8,6	710	710x7,2
710x9,5	780	780x7,8
710x9,5	800	800x7,9
800x10,5	900	900x8,7
900x11,0	950	950x9,1
900x11,0	1000	1000x9,4
1000x12,6	1100	1100x10,2
1100x13,6	1200	1200x11,0
1200x14,8	1300	1300x12,0
1300x15,4	1400	1400x12,5

8.1.2b Dimensions of HDPE sleeves used for production of heat shrinkable joints covering two adjacent diameters (double expanded)

HDPE100 SLEEVE Diameter x wall thickness [mm]	NOMINAL DIAMETER OF THE JOINT 1 DN: [mm]	NOMINAL DIAMETER OF THE JOINT 2 DN: [mm]	JACKET PIPE , for which the joint is dedicated D _{ext} : [mm]
88x4,0	90	110	90x3,0 / 110x3,0
107x4,0	110	125	110x3,0 / 125x3,0
122x4,0	125	140	125x3,0 / 140x3,0
138x4,0	140	160	140x3,0 / 160x3,0
154x4,0	160	180	160x3,0 / 180x3,0
176x4,0	180	200	180x3,0 / 200x3,2
196x4,2	200	225	200x3,2 / 225x3,4
216x4,5	225	250	225x3,4 / 250x3,6
243x5,0	250	280	250x3,6 / 280x3,9
270x5,2	280	315	280x3,9 / 315x4,1
299x5,8	315	355	315x4,1 / 355x4,5
339x6,1	355	400	355x4,5 / 400x4,8
378x6,5	400	450	400x4,8 / 450x5,2
426x7,0	450	500	450x5,2 / 500x5,6
480x7,5	500	520	500x5,6 / 520x5,8
480x7,5	500	560	500x5,6 / 560x6,0
480x7,5	520	560	520x5,8 / 560x6,0
500x8,6	560	630	560x6,0 / 630x6,6
560x9,5	630	670	630x6,6 / 670x6,9
560x9,5	630	710	630x6,6 / 710x7,2
560x9,5	670	710	670x6,9 / 710x7,2

8.1.3 MTX2 cross-linked heat shrinkable joints with mastic and hot-melt adhesive

Plain (straight) joints, shrinkable on their entire length.



JACKET PIPE external diameter Dz: [mm]	MTX2 JOINT +max internal diameter Dw: [mm]	MTX2 JOINT Std wall thickness after shrinking s: [mm]	MTX2 JOINT length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	600 / 700	MTX2-090L600W /..L700
110	127 ⁺⁵	3,0	600 / 700	MTX2-110L600W /..L700
125	141 ⁺⁵	3,0	600 / 700	MTX2-125L600W /..L700
140	158 ⁺⁵	3,0	600 / 700	MTX2-140L600W /..L700
160	178 ⁺⁵	3,0	600 / 700	MTX2-160L600W /..L700
180	197 ⁺⁵	3,0	600 / 700	MTX2-180L600W /..L700
200	222 ⁺¹⁰	3,2	600 / 700	MTX2-200L600W /..L700
225	249 ⁺¹⁰	3,4	600 / 700	MTX2-225L600W /..L700
250	274 ⁺¹⁰	3,6	600 / 700	MTX2-250L600W /..L700
280	304 ⁺¹⁰	3,9	700	MTX2-280L700W
315	341 ⁺¹⁰	4,1	700	MTX2-315L700W
355	382 ⁺¹⁰	4,5	700	MTX2-355L700W
400	430 ⁺¹⁵	4,8	700	MTX2-400L700W
450	480 ⁺¹⁵	5,2	700	MTX2-450L700W
500	535 ⁺¹⁵	5,6	700	MTX2-500L700W
520	555 ⁺¹⁵	5,8	700	MTX2-520L700W
560	595 ⁺¹⁵	6,0	700	MTX2-560L700W
630	665 ⁺²⁰	6,6	700	MTX2-630L700W
670	705 ⁺²⁰	6,9	700	MTX2-670L700W
710	750 ⁺²⁰	7,2	700	MTX2-710L700W
780	820 ⁺²⁰	7,8	700	MTX2-780L700W
800	845 ⁺²⁰	7,9	700	MTX2-800L700W
900	945 ⁺²⁰	8,7	700	MTX2-900L700W
950	995 ⁺²⁰	9,1	700	MTX2-950L700W
1000	1045 ⁺²⁰	9,4	700	MTX2-1000L700W
1100	1150 ⁺²⁵	10,2	700	MTX2-1100L700W
1200	1250 ⁺²⁵	11,0	700	MTX2-1200L700W
1300	1355 ⁺³⁰	11,8	700	MTX2-1300L700W
1400	1460 ⁺³⁰	12,5	700	MTX2-1400L700W

* Joints' diameter tolerance +/- 1,0mm

** Other lengths of MTX2 joints available on request

* Joints' length tolerance +/- 10mm

The MTX2 joint is to be placed on pre-insulated pipeline prior to welding of the steel pipes. Both ends of the joint are to be shrunk with delicate (yellow) flame of gas burner. Applications in all soil conditions with the exception of those polluted with oil products. It is recommended for use in case of high ground water levels, long number of axial transitions, acidic soils, waste storage sites, etc.

The set of MTX2 joint consists of:

- radiated cross-linked heat shrinkable sleeve with pre-applied mastic and hot melt adhesive
- ventilation plugs – 2 pieces
- weldable plugs – 2 pieces
- cleaning tissues – 2 pieces

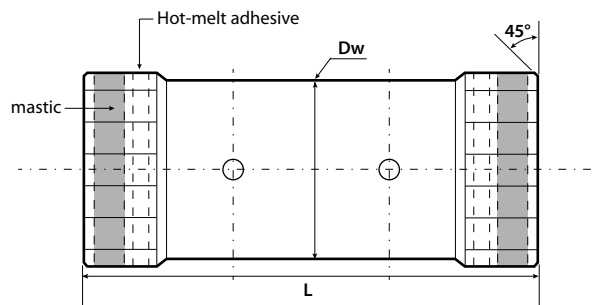


MTX2 joints are wrapped in white LDPE film and should be stored and transported in upright position to avoid ovalization. Maximum temperature during storage and transport shall not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.4 MTX2 cross-linked heat shrinkable joints with mastic and hot-melt adhesive.

Bell-ended joints, shrinkable on their entire length.



JACKET PIPE external diameter Dz: [mm]	MTX2 JOINT +max internal diameter Dw: [mm]	MTX2 JOINT Std wall thickness after shrinking s: [mm]	MTX2 JOINT length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	600 / 700	MTX2k-090L600W / ..L700
110	127 ⁺⁵	3,0	600 / 700	MTX2k-110L600W / ..L700
125	141 ⁺⁵	3,0	600 / 700	MTX2k-125L600W / ..L700
140	158 ⁺⁵	3,0	600 / 700	MTX2k-140L600W / ..L700
160	178 ⁺⁵	3,0	600 / 700	MTX2k-160L600W / ..L700
180	197 ⁺⁵	3,0	600 / 700	MTX2k-180L600W / ..L700
200	222 ⁺¹⁰	3,2	600 / 700	MTX2k-200L600W / ..L700
225	249 ⁺¹⁰	3,4	600 / 700	MTX2k-225L600W / ..L700
250	274 ⁺¹⁰	3,6	600 / 700	MTX2k-250L600W / ..L700
280	304 ⁺¹⁰	3,9	700	MTX2k-280L700W
315	341 ⁺¹⁰	4,1	700	MTX2k-315L700W
355	382 ⁺¹⁰	4,5	700	MTX2k-355L700W
400	430 ⁺¹⁵	4,8	700	MTX2k-400L700W
*** 450	480 ⁺¹⁵	5,2	700	MTX2k-450L700W
*** 500	535 ⁺¹⁵	5,6	700	MTX2k-500L700W
*** 520	555 ⁺¹⁵	5,8	700	MTX2k-520L700W
*** 560	595 ⁺¹⁵	6,0	700	MTX2k-560L700W
*** 630	665 ⁺²⁰	6,6	700	MTX2k-630L700W

* Joints' diameter tolerance +/- 1,0mm

* Joints' length tolerance +/- 10mm

** Other lengths of MTX2 joints available on request

*** diameters available upon request

The MTX2 bell-ended joint is to be placed on pre-insulated pipeline prior to welding of the steel pipes. Both bell-ends of the joint are to be shrunk with delicate (yellow) flame of gas burner. Applications in all soil conditions with the exception of those polluted with oil products.. It is recommended for use in case of high ground water levels, long number of axial transitions, acidic soils, waste storage sites, etc.

The set of MTX2 bell-ended joint consists of:

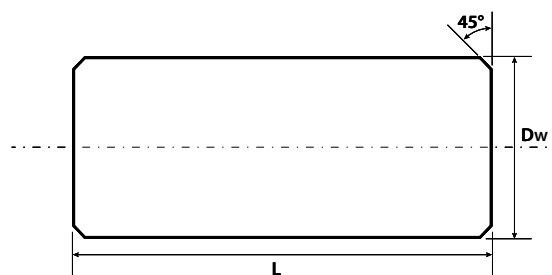
- adiated cross-linked heat shrinkable sleeve with pre-applied mastic and hot melt adhesive
- ventilation plugs – 2 pieces
- weldable plugs – 2 pieces
- cleaning tissues – 2 pieces



MTX2 bell-ended joints are wrapped in white LDPE film and should be stored and transported in upright position to avoid ovalization. Maximum temperature during storage and transport shall not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.5 MT multi-purpose heat shrinkable sleeves



JACKET PIPE external diameter Dz: [mm]	MT SLEEVE +max internal diameter Dw: [mm]	MT SLEEVE Std wall thickness after shrinking s: [mm]	MT SLEEVE length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	500 / 600 / 700	MT-090L500 /..L700
110	127 ⁺⁵	3,0	500 / 600 / 700	MT-110L500 /..L700
125	141 ⁺⁵	3,0	500 / 600 / 700	MT-125L500 /..L700
140	158 ⁺⁵	3,0	500 / 600 / 700	MT-140L500 /..L700
160	178 ⁺⁵	3,0	500 / 600 / 700	MT-160L500 /..L700
180	197 ⁺⁵	3,0	500 / 600 / 700	MT-180L500 /..L700
200	222 ⁺¹⁰	3,2	500 / 600 / 700	MT-200L500 /..L700
225	249 ⁺¹⁰	3,4	500 / 600 / 700	MT-225L500 /..L700
250	274 ⁺¹⁰	3,6	500 / 600 / 700	MT-250L500 /..L700
280	304 ⁺¹⁰	3,9	500 / 600 / 700	MT-280L500 /..L700
315	341 ⁺¹⁰	4,1	500 / 600 / 700	MT-315L500 /..L700
355	382 ⁺¹⁰	4,5	500 / 600 / 700	MT-355L500 /..L700
400	430 ⁺¹⁵	4,8	500 / 600 / 700	MT-400L500 /..L700
450	480 ⁺¹⁵	5,2	500 / 600 / 700	MT-450L500 /..L700
500	535 ⁺¹⁵	5,6	500 / 600 / 700	MT-500L500 /..L700
520	555 ⁺¹⁵	5,8	500 / 600 / 700	MT-520L500 /..L700
560	595 ⁺¹⁵	6,0	500 / 600 / 700	MT-560L500 /..L700
630	665 ⁺²⁰	6,6	700	MT-630L700
670	705 ⁺²⁰	6,9	700	MT-670L700
710	750 ⁺²⁰	7,2	700	MT-710L700
780	820 ⁺²⁰	7,8	700	MT-780L700
800	845 ⁺²⁰	7,9	700	MT-800L700
900	945 ⁺²⁰	8,7	700	MT-900L700
950	995 ⁺²⁰	9,1	700	MT-950L700
1000	1045 ⁺²⁰	9,4	700	MT-1000L700
1100	1150 ⁺²⁵	10,2	700	MT-1100L700
1200	1250 ⁺²⁵	11,0	700	MT-1200L700
1300	1355 ⁺³⁰	11,8	700	MT-1300L700
1400	1460 ⁺³⁰	12,5	700	MT-1400L700

* Joints' diameter tolerance +/- 1,0mm

* Joints' length tolerance +/- 10mm

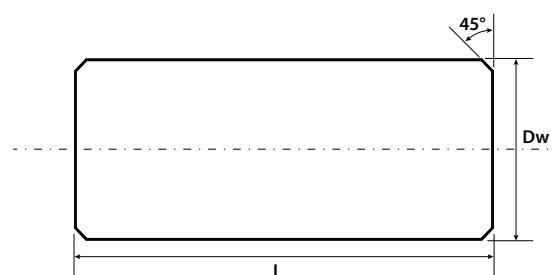
** Other lengths of MT sleeves available on request

Multi-purpose (non-cross-linked) heat-shrinkable sleeves are used as:

- classic heat-shrinkable joints when used with mastic and/or hot-melt adhesive,
- repair joints, that once cut longitudinally can be welded again by an extruder,
- sliding sleeves for electro-fusion welding joints in combination with EG40 heating elements,
- atypical joints, that can be freely cut and drilled for welding plugs, in any spot desired.

MT sleeves should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport shall not exceed 35°C. On customer's demand the MT sleeves can be wrapped in white LDPE foil (MT+F).

8.1.6 MTr heat-shrinkable joints covering two adjacent diameters (double expanded), straight shaped



JACKET PIPE external diameter Dz_2/Dz_1 : [mm]	MTr SLEEVE +max internal diameter Dw: [mm]	MTr SLEEVE Std wall thickness after shrinking s: [mm]	MTr SLEEVE length L: [mm]	CATALOGUE No.
90/110	127 ⁺⁵	3,0	650 / 700	MTr-090/110L650 /..L700
110/125	141 ⁺⁵	3,0	650 / 700	MTr-110/125L650 /..L700
125/140	158 ⁺⁵	3,0	650 / 700	MTr-125/140L650 /..L700
140/160	176 ⁺⁵	3,0	650 / 700	MTr-140/160L650 /..L700
160/180	196 ⁺⁵	3,0	650 / 700	MTr-160/180L650 /..L700
180/200	220 ⁺¹⁰	3,2	650 / 700	MTr-180/200L650 /..L700
200/225	247 ⁺¹⁰	3,4	650 / 700	MTr-200/225L650 /..L700
225/250	272 ⁺¹⁰	3,6	650 / 700	MTr-225/250L650 /..L700
250/280	302 ⁺¹⁰	3,9	650 / 700	MTr-250/280L650 /..L700
280/315	339 ⁺¹⁰	4,1	650 / 700	MTr-280/315L650 /..L700
315/355	380 ⁺¹⁰	4,5	650 / 700	MTr-315/355L650 /..L700
355/400	430 ⁺¹⁵	4,8	700	MTr-355/400L700
400/450	480 ⁺¹⁵	5,2	700	MTr-400/450L700
450/500	535 ⁺¹⁵	5,6	700	MTr-450/500L700
500/520	555 ⁺¹⁵	5,8	700	MTr-500/520L700
500/560	595 ⁺¹⁵	6,0	700	MTr-500/560L700
520/560	595 ⁺¹⁵	6,0	700	MTr-520/560L700
560/630	665 ⁺²⁰	6,6	700	MTr-560/630L700
630/670	705 ⁺²⁰	6,9	700	MTr-630/670L700
730/710	750 ⁺²⁰	7,2	700	MTr-630/710L700
670/710	750 ⁺⁵⁰	7,8	700	MTr-670/710L700

* Joints' diameter tolerance +/- 1,0mm

* Joints' length tolerance +/- 10mm

** Other lengths of MTr sleeves available on request

Heat shrinkable double-expanded joints straight shaped, covering two adjacent diameters, used as:

- regular heat shrinkable joints in combination with mastic and/or hot melt adhesive,
- repair joints, which after longitudinal cutting can be welded again with an extruder,
- electro-fusion welding in combination with the heating elements,
- atypically joints, that can be freely cut and drilled for welding plugs, in any spot desired

MTr joints should be stored and transported in upright position. The maximum temperature during transport and storage must not exceed 35°C.

On customer's demand the MTr joints can be wrapped in white LDPE foil (MTr+F).

8.1.7a MTM heat shrinkable joints with mastic



JACKET PIPE external diameter Dz: [mm]	MTM SLEEVE +max internal diameter Dw: [mm]	MTM SLEEVE Std wall thickness after shrinking s: [mm]	MTM SLEEVE length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	500 / 600 / 700	MTM-090L500W /..L700W
110	127 ⁺⁵	3,0	500 / 600 / 700	MTM-110L500W /..L700W
125	141 ⁺⁵	3,0	500 / 600 / 700	MTM-125L500W /..L700W
140	158 ⁺⁵	3,0	500 / 600 / 700	MTM-140L500W /..L700W
160	178 ⁺⁵	3,0	500 / 600 / 700	MTM-160L500W /..L700W
180	197 ⁺⁵	3,0	500 / 600 / 700	MTM-180L500W /..L700W
200	222 ⁺¹⁰	3,2	500 / 600 / 700	MTM-200L500W /..L700W
225	249 ⁺¹⁰	3,4	500 / 600 / 700	MTM-225L500W /..L700W
250	274 ⁺¹⁰	3,6	500 / 600 / 700	MTM-250L500W /..L700W
280	304 ⁺¹⁰	3,9	500 / 600 / 700	MTM-280L500W /..L700W
315	341 ⁺¹⁰	4,1	500 / 600 / 700	MTM-315L500W /..L700W
355	382 ⁺¹⁰	4,5	500 / 600 / 700	MTM-355L500W /..L700W
400	430 ⁺¹⁵	4,8	500 / 600 / 700	MTM-400L500W /..L700W
450	480 ⁺¹⁵	5,2	500 / 600 / 700	MTM-450L500W /..L700W
500	535 ⁺¹⁵	5,6	500 / 600 / 700	MTM-500L500W /..L700W
520	555 ⁺¹⁵	5,8	500 / 600 / 700	MTM-520L500W /..L700W
560	595 ⁺¹⁵	6,0	500 / 600 / 700	MTM-560L500W /..L700W
630	665 ⁺²⁰	6,6	700	MTM-630L700W
670	705 ⁺²⁰	6,9	700	MTM-670L700W
710	750 ⁺²⁰	7,2	700	MTM-710L700W
780	820 ⁺²⁰	7,8	700	MTM-780L700W
800	845 ⁺²⁰	7,9	700	MTM-800L700W
900	945 ⁺²⁰	8,7	700	MTM-900L700W
950	995 ⁺²⁰	9,1	700	MTM-950L700W
1000	1045 ⁺²⁰	9,4	700	MTM-1000L700W
1100	1150 ⁺²⁵	10,2	700	MTM-1100L700W
1200	1250 ⁺²⁵	11,0	700	MTM-1200L700W
1300	1355 ⁺³⁰	11,8	700	MTM-1300L700W
1400	1460 ⁺³⁰	12,5	700	MTM-1400L700W

* Joints' diameter tolerance +/- 1,0mm

** Other lengths of MTM sleeves available on request

* Joints' length tolerance +/- 10mm

MTM joint is to be placed on pre-insulated pipeline prior to welding of the steel pipes. Both ends of the joint are to be shrunk with delicate flame of gas burner. Due to the single sealing the MTM joint is to be used where ground water level is below the level of pre-insulated pipes and where the soil is not polluted with oil products and chemicals.

Set of MTM joint contains:

- heat shrinkable sleeve with pre-applied mastic
- ventilation plugs – 2 pieces
- weldable plugs – 2 pieces

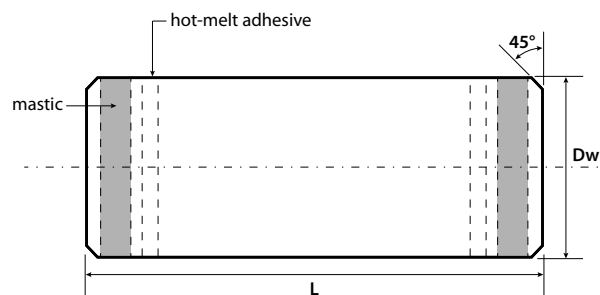


MTM joints are wrapped in white LDPE foil and should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport shall not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used.

When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.7b MTM+ heat shrinkable joints with mastic and hot melt adhesive



JACKET PIPE external diameter Dz: [mm]	MTM+ SLEEVE +max internal diameter Dw: [mm]	MTM+ SLEEVE Std wall thickness after shrinking s: [mm]	MTM+ SLEEVE length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	600 / 700	MTM+-090L600W /..L700W
110	127 ⁺⁵	3,0	600 / 700	MTM+-110L600W /..L700W
125	141 ⁺⁵	3,0	600 / 700	MTM+-125L600W /..L700W
140	158 ⁺⁵	3,0	600 / 700	MTM+-140L600W /..L700W
160	178 ⁺⁵	3,0	600 / 700	MTM+-160L600W /..L700W
180	197 ⁺⁵	3,0	600 / 700	MTM+-180L600W /..L700W
200	222 ⁺¹⁰	3,2	600 / 700	MTM+-200L600W /..L700W
225	249 ⁺¹⁰	3,4	600 / 700	MTM+-225L600W /..L700W
250	274 ⁺¹⁰	3,6	600 / 700	MTM+-250L600W /..L700W
280	304 ⁺¹⁰	3,9	600 / 700	MTM+-280L600W /..L700W
315	341 ⁺¹⁰	4,1	600 / 700	MTM+-315L600W /..L700W
355	382 ⁺¹⁰	4,5	600 / 700	MTM+-355L600W /..L700W
400	430 ⁺¹⁵	4,8	600 / 700	MTM+-400L600W /..L700W
450	480 ⁺¹⁵	5,2	600 / 700	MTM+-450L600W /..L700W
500	535 ⁺¹⁵	5,6	600 / 700	MTM+-500L600W /..L700W
520	555 ⁺¹⁵	5,8	600 / 700	MTM+-520L600W /..L700W
560	595 ⁺¹⁵	6,0	600 / 700	MTM+-560L600W /..L700W
630	665 ⁺²⁰	6,6	700	MTM+-630L700W
670	705 ⁺²⁰	6,9	700	MTM+-670L700W
710	750 ⁺²⁰	7,2	700	MTM+-710L700W
780	820 ⁺²⁰	7,8	700	MTM+-780L700W
800	845 ⁺²⁰	7,9	700	MTM+-800L700W
900	945 ⁺²⁰	8,7	700	MTM+-900L700W
950	995 ⁺²⁰	9,1	700	MTM+-950L700W
1000	1045 ⁺²⁰	9,4	700	MTM+-1000L700W
1100	1150 ⁺²⁵	10,2	700	MTM+-1100L700W
1200	1250 ⁺²⁵	11,0	700	MTM+-1200L700W
1300	1355 ⁺³⁰	11,8	700	MTM+-1300L700W
1400	1460 ⁺³⁰	12,5	700	MTM+-1400L700W

* Joints' diameter tolerance +/- 1,0mm

** Other lengths of MTM+ sleeves available on request

* Joints' length tolerance +/- 10mm

The MTM+ joint is to be placed on the pre-insulated pipeline prior to welding of the steel pipes. Both ends of the joint are to be shrunk with delicate flame of the gas burner. Due to the single sealing, the MTM+ joint is used where the ground water level is below the level of pre-insulated pipes and where the soil is not polluted with oil or chemical products.

Set of MTM+ joint contains:

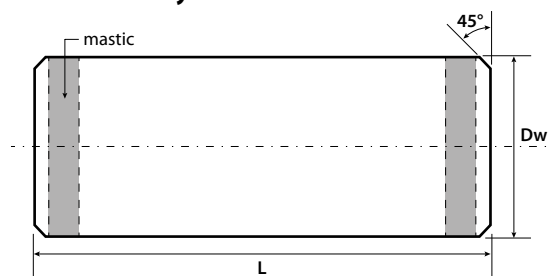
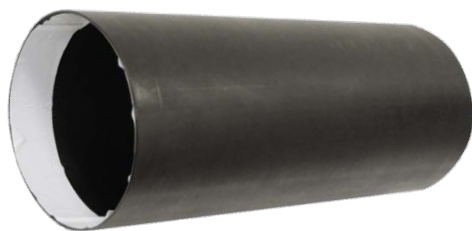
- heat shrinkable sleeve with pre-applied mastic and hot melt adhesive
- ventilation plugs – 2 pcs
- welding plugs – 2 pcs



MTM+ joints are wrapped in white foil and should be stored and transported in upright position. The maximum temperature during transport and storage must not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.7c MTMan heat shrinkable joints with mastic flame retardant with antistatic layer



JACKET PIPE external diameter Dz: [mm]	MTMan SLEEVE +max internal diameter Dw: [mm]	MTMan SLEEVE Std wall thickness after shrinking s: [mm]	MTMan SLEEVE length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	600 / 700	MTMan-090L600W /..L700W
110	127 ⁺⁵	3,0	600 / 700	MTMan-110L600W /..L700W
125	141 ⁺⁵	3,0	600 / 700	MTMan-125L600W /..L700W
140	158 ⁺⁵	3,0	600 / 700	MTMan-140L600W /..L700W
160	178 ⁺⁵	3,0	600 / 700	MTMan-160L600W /..L700W
180	197 ⁺⁵	3,0	600 / 700	MTMan-180L600W /..L700W
200	222 ⁺¹⁰	3,2	600 / 700	MTMan-200L600W /..L700W
225	249 ⁺¹⁰	3,4	600 / 700	MTMan-225L600W /..L700W
250	274 ⁺¹⁰	3,6	600 / 700	MTMan-250L600W /..L700W
280	304 ⁺¹⁰	3,9	600 / 700	MTMan-280L600W /..L700W
315	341 ⁺¹⁰	4,1	600 / 700	MTMan-315L600W /..L700W
355	382 ⁺¹⁰	4,5	600 / 700	MTMan-355L600W /..L700W
400	430 ⁺¹⁵	4,8	600 / 700	MTMan-400L600W /..L700W
450	480 ⁺¹⁵	5,2	600 / 700	MTMan-450L600W /..L700W
500	535 ⁺¹⁵	5,6	600 / 700	MTMan-500L600W /..L700W
560	595 ⁺¹⁵	6,0	600 / 700	MTMan-560L600W /..L700W
630	665 ⁺²⁰	6,6	700	MTMan-630L700W
710	750 ⁺²⁰	7,2	700	MTMan-710L700W
800	845 ⁺²⁰	7,9	700	MTMan-800L700W
900	945 ⁺²⁰	8,7	700	MTMan-900L700W
1000	1045 ⁺²⁰	9,4	700	MTMan-1000L700W
1100	1150 ⁺²⁵	10,2	700	MTMan-1100L700W
1200	1250 ⁺²⁵	11,0	700	MTMan-1200L700W

* Joints' diameter tolerance +/- 1,0mm

* Joints' length tolerance +/- 10mm

** Other lengths of MTMan sleeves available on request

MTMan joint is to be placed on the pre-insulated pipeline before connecting the pressure pipes. Both ends of the joint are to be shrunk with delicate flame of the gas burner.

The joints are to be used in the installations in mining plants in chambers and underground mine workings classified as grades „A”, „B” and „C” of methane explosion risk and class „A” or „B” of coal dust explosion risk.

Set of MTMan joint contains:

- flame retardant and antistatic heat shrinkable sleeve with pre-applied flame retardant mastic
- ventilation plugs – 2 pcs
- two-parts expanding (spiking) plugs – 2 pcs
- cleaning tissues – 2 pcs

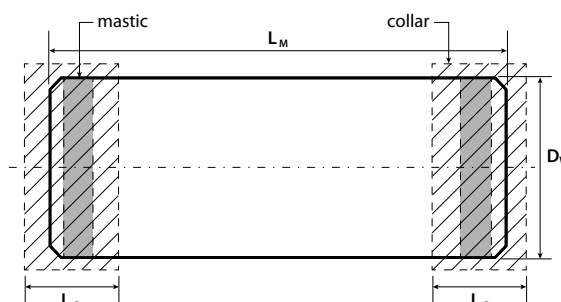


MTM+ joints are wrapped in white foil and should be stored and transported in upright position. The maximum temperature during transport and storage must not exceed 35°C.

Additional accessories: during assembly of the joints components of flame retardant polyurethane foam (PUR CEGA) are to be used. When ordering, please provide information if the joints are to be delivered together with such PUR foam.

Remark: MTMan joints are offered exclusively with CEGA jacket pipes type PE-NP/AS or flame retardant pre-insulated pipes.

8.1.8 MTO1 heat shrinkable joints with mastic and additional sealing by cross-linked collars, (double independent sealing)



JACKET PIPE external diameter D _z : [mm]	MTO1 JOINT +max internal diameter D _w : [mm]	MTO1 JOINT Std wall thickness after shrinking s: [mm]	JOINT MTO1 length L _M : [mm]	COLLAR L _C : [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	600 / 700	150	MTO1-090L600W-150 /..L700W-150
110	127 ⁺⁵	3,0	600 / 700	150	MTO1-110L600W-150 /..L700W-150
125	141 ⁺⁵	3,0	600 / 700	150	MTO1-125L600W-150 /..L700W-150
140	158 ⁺⁵	3,0	600 / 700	150	MTO1-140L600W-150 /..L700W-150
160	178 ⁺⁵	3,0	600 / 700	150	MTO1-160L600W-150 /..L700W-150
180	197 ⁺⁵	3,0	600 / 700	150	MTO1-180L600W-150 /..L700W-150
200	222 ⁺⁵	3,2	600 / 700	150	MTO1-200L600W-150 /..L700W-150
225	249 ⁺⁵	3,4	600 / 700	150	MTO1-225L600W-150 /..L700W-150
250	274 ⁺⁵	3,6	600 / 700	150	MTO1-250L600W-150 /..L700W-150
280	304 ⁺⁵	3,9	600 / 700	150	MTO1-280L600W-150 /..L700W-150
315	341 ⁺⁵	4,1	600 / 700	150	MTO1-315L600W-150 /..L700W-150
355	382 ⁺⁵	4,5	600 / 700	150	MTO1-355L600W-150 /..L700W-150
400	430 ⁺¹⁵	4,8	600 / 700	225	MTO1-400L600W-225 /..L700W-225
450	480 ⁺¹⁵	5,2	600 / 700	225	MTO1-450L600W-225 /..L700W-225
500	535 ⁺¹⁵	5,6	600 / 700	225	MTO1-500L600W-225 /..L700W-225
520	555 ⁺¹⁵	5,8	600 / 700	225	MTO1-520L600W-225 /..L700W-225
560	595 ⁺¹⁵	6,0	600 / 700	225	MTO1-560L600W-225 /..L700W-225

* Length tolerance $\pm 1,0$ mm

** Other lengths and diameters of MTO1 joint available on request

MTO1 joint is to be placed on pre-insulated pipeline prior to welding of the steel pipes. Both ends of the joint and the heat-shrinkable collars are to be shrunk with delicate flame of gas burner. The MTO1 joint is a double sealing solution to be used in all soil conditions, with exception of soil polluted with oil products.

Set of MTO1 joint contains:

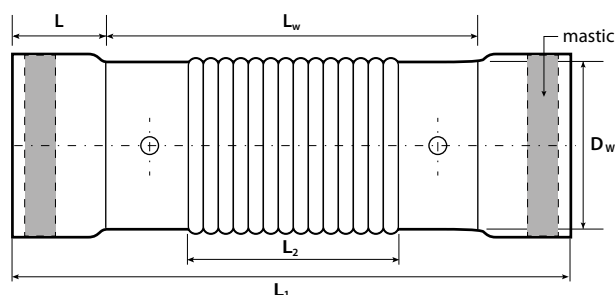
- heat shrinkable sleeve with pre-applied mastic
- cross-linked heat-shrinkable collars with hot-melt visco-elastic sealing – 2 pieces
- ventilation plugs – 2 pieces
- weldable plugs – 2 pieces



MTO1 joints are wrapped in white LDPE foil and should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport shall not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.9 MTF1 cross-linked heat shrinkable flexible elbow joints (Flex Bend type 0-90°)



JACKET PIPE external diameter Dz: [mm]	MTF1 JOINT min. int. diameter Dw: [mm]	MTF1 length L ₁ : [mm]	MTF1 length of elastic part L ₂ : [mm]	STEEL PIPE DN/external dia. x wall thickness D x s: [mm]	STEEL PIPE radius R: [mm]	CATALOGUE No.
90	104	980	560	20 / 26,9 x 2,6 25 / 33,7 x 2,6	200	MTF1-090L980R
110	125	980	560	32 / 42,4 x 2,9 40 / 48,3 x 2,9	200	MTF1-110L980R
125	140	1050	630	50 / 60,3 x 3,2	240	MTF1-125L1050R
140	155	1050	630	65 / 76,1 x 3,2	240	MTF1-140L1050R
160	175	1050	630	80 / 88,9 x 3,6	240	MTF1-160L1050R
180	196	1050	630	80 / 88,9 x 3,6	240	MTF1-180L1050R
200	216	1120	700	100 / 114,3 x 3,6	286	MTF1-200L1120R
225	242	1220	800	125 / 139,7 x 4,0	349	MTF1-225L1220R
250	267	1340	920	150 / 168,3 x 4,5	421	MTF1-250L1340R

*MTF1 280, 315, 355 400 mm in the pipeline

The MTF1 flexible elbow joints, after prior heating up of the flexible middle section allow to shape any desired angle in 0-90 degrees range. In case of unforeseen collisions or obstacles during construction of district heating pipeline, they allow the change of its course.

MTF1 elbow joint can be used in all soil conditions.

Set of MTF1 joint contains:

- cross-linked joint with flexible middle section and heat shrinkable ends, with pre-applied mastic

Additional accessories:

- ventilation plugs – 2 pcs
- expanding, spiking plugs, two-parts – 2 pcs
- FOPS patches protecting from infiltration of humidity through the foaming openings – 2 pcs



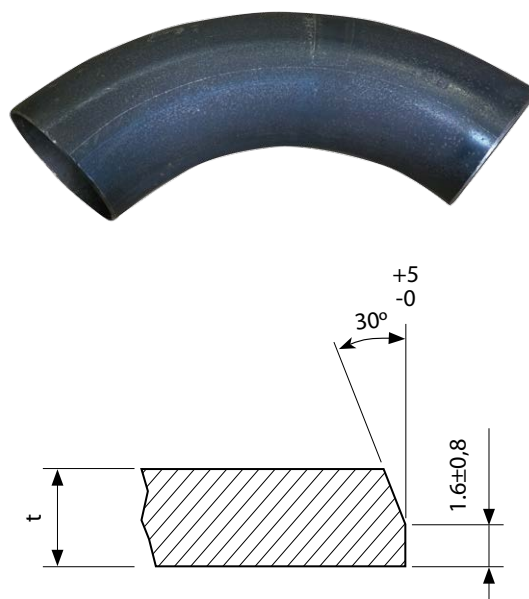
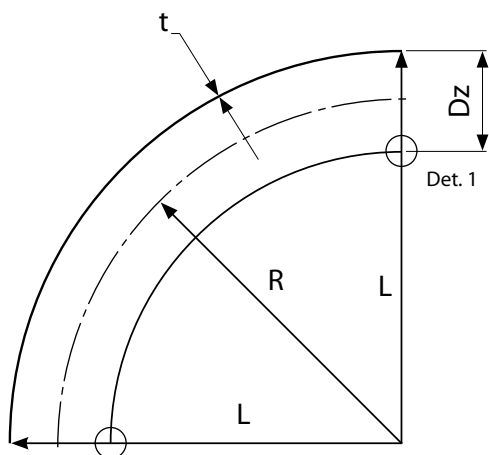
During assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

MTF1 joints are wrapped in white LDPE foil and should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport must not exceed 35°C.

NOTE: due to larger internal volume of the flexible elbow joint the components of PUR foam have to be dedicated for this type of products. Do not use foam designed for standard (plain) joints.

8.1.10 Steel bends for the flexible elbow joints (Flex-bends).

Steel bends are produced of seamless steel pipes, of P235GH, according to EN 10217-2.

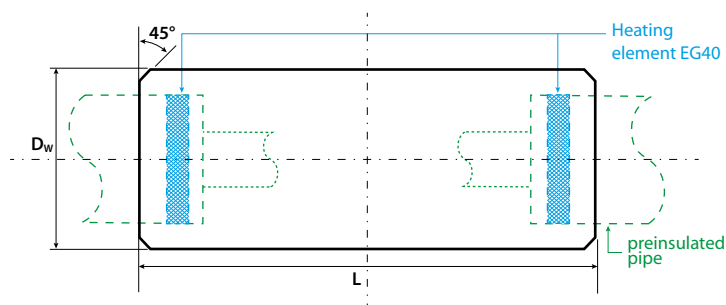


Nominal diameter: DN [mm]	The external diameter: Dz [mm]	The wall thickness t: [mm]	The radius R +5/-5: [mm]	The external radius L +5/-5: [mm]	CATALOGUE No.
20	26,9	2,6	200	213	KS-26926/90
25	33,7	2,6	200	217	KS-33726/90
32	42,4	2,9	200	221	KS-42429/90
40	48,3	2,9	200	224	KS-48329/90
50	60,3	3,2	240	270	KS-60332/90
65	76,1	3,2	240	278	KS-76132/90
80	88,9	3,6	240	284	KS-88936/90
100	114,3	3,6	286	343	KS-114336/90
125	139,7	4,0	349	419	KS-139740/90
150	168,3	4,5	421	505	KS-168345/90

*** Other diameters of bends available on request**

The steel bends are being produced only as 90° elbow. Other angles are to be reached by cutting off the ends of the elbow by required angle.

8.1.11 MEZ electro-fusion welding, sliding (closed) heat shrinkable joints (to be shrunk prior to welding)



JACKET PIPE external diameter Dz: [mm]	MEZ JOINT +max internal diameter Dw: [mm]	MEZ JOINT Std wall thickness after shrinking s: [mm]	MEZ JOINT length L: [mm]	Heating element EG40 length [mm]	CATALOGUE No.
110	127 ⁺⁵	3,0	700	342	MEZ-110L700W
125	141 ⁺⁵	3,0	700	389	MEZ-125L700W
140	158 ⁺⁵	3,0	700	436	MEZ-140L700W
160	178 ⁺⁵	3,0	700	499	MEZ-160L700W
180	197 ⁺⁵	3,0	700	562	MEZ-180L700W
200	222 ⁺¹⁰	3,2	700	625	MEZ-200L700W
225	249 ⁺¹⁰	3,4	700	703	MEZ-225L700W
250	274 ⁺¹⁰	3,6	700	782	MEZ-250L700W
280	304 ⁺¹⁰	3,9	700	876	MEZ-280L700W
315	341 ⁺¹⁰	4,1	700	986	MEZ-315L700W
355	382 ⁺¹⁰	4,5	700	1111	MEZ-355L700W
400	430 ⁺¹⁵	4,8	700	1253	MEZ-400L700W
450	480 ⁺¹⁵	5,2	700	1410	MEZ-450L700W
500	535 ⁺¹⁵	5,6	700	1567	MEZ-500L700W
520	555 ⁺¹⁵	5,8	700	1629	MEZ-520L700W
560	595 ⁺¹⁵	6,0	700	1755	MEZ-560L700W
630	665 ⁺¹⁵	6,6	700	1975	MEZ-630L700W
710	750 ⁺²⁰	7,2	700	2226	MEZ-710L700W
780	820 ⁺²⁰	7,8	700	2246	MEZ-780L700W
800	845 ⁺²⁰	7,9	700	2509	MEZ-800L700W
900	945 ⁺²⁰	8,7	700	2823	MEZ-900L700W
1000	1045 ⁺²⁰	9,4	700	3137	MEZ-1000L700W
1100	1150 ⁺²⁵	10,2	700	3451	MEZ-1100L700W
1200	1250 ⁺²⁵	11,0	700	3765	MEZ-1200L700W
1300	1355 ⁺³⁰	11,8	700	4079	MEZ-1300L700W
1400	1460 ⁺³⁰	12,5	700	4393	MEZ-1400L700W

* Joints' diameter tolerance +/- 1,0mm

** Joints' length tolerance +/- 10mm

*** Other diameters and lengths of MEZ joints available on request

MEZ joint is to be placed on pre-insulated pipeline prior to welding of the steel pipes. Both ends of the joint are to be shrunk with delicate flame of gas burner, after prior installation of heating elements EG40 on the pre-insulated pipe. The **MEZ** is used for all soil conditions, also in case of pollution with oil products. Recommended for use in case of high level of ground water, large number of axial transitions, acidic soils, waste storage sites, etc. The electro-fusion welding joints can be used with constant ground water levels of 0.5m above the top of pre-isolated pipe.

Note: sealing tightness test shall be performed prior to PUR foaming.

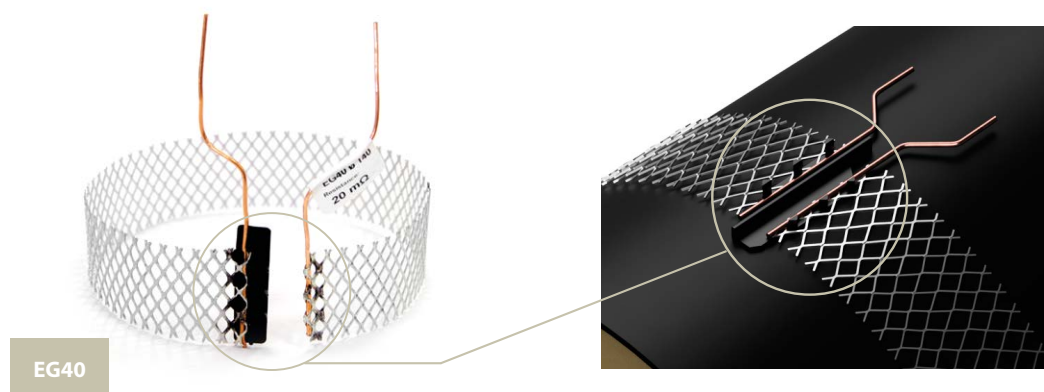
Set of MEZ joint contains:

- MT heat-shrinkable sleeve
- heating elements – 2 pieces
- ventilation plugs – 2 pieces
- welding plugs – 2 pieces

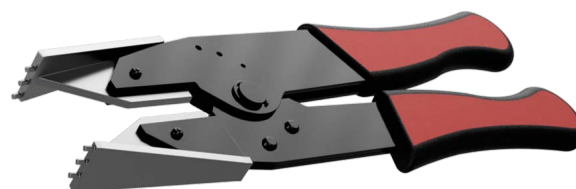


Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. While ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.12 Heating elements EG40 for MEZ electro-fusion welding, sliding (closed) heat shrinkable joints (to be shrunk prior to welding)



JACKET PIPE external diameter Dz: [mm]	Length of the heating element EG40 [mm]	Heating element EG40 (width 40mm) 1 pc
110	342	EG40-110
125	389	EG40-125
140	436	EG40-140
160	499	EG40-160
180	562	EG40-180
200	625	EG40-200
225	703	EG40-225
250	782	EG40-250
280	876	EG40-280
315	986	EG40-315
355	1111	EG40-355
400	1253	EG40-400
450	1410	EG40-450
500	1567	EG40-500
520	1629	EG40-520
560	1755	EG40-560
630	1975	EG40-630
710	2226	EG40-710
780	2246	EG40-780
800	2509	EG40-800
900	2823	EG40-900
1000	3137	EG40-1000
1100	3451	EG40-1100
1200	3765	EG40-1200
1300	4079	EG40-1300
1400	4393	EG40-1400



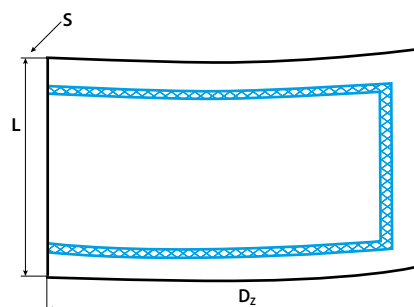
Tensioner to heating elements EG40

1pc

NEL

EG40 heating elements are designed for the MEZ electro-fusion welding joints system. Compatibility with 2k8P-I, 3k3P and 3k3P-1 welding units enables comfortable work on the building site with automatic mode. 2nd generation heating elements thanks to the changed design (more flexible material) and unique plastic locker solve most of the problems with assembly on the construction site.

8.1.13 MEP open (plate type) electro-fusion welding joints



JACKET PIPE external diameter Dz: [mm]	MEP PLATE wall thickness s: [mm]	MEP PLATE length L: [mm]	CATALOGUE No.
160	4	700 / 900	MEP-160L700W /..L900W
180	4	700 / 900	MEP-180L700W /..L900W
200	4	700 / 900	MEP-200L700W /..L900W
225	4	700 / 900	MEP-225L700W /..L900W
250	4	700 / 900	MEP-250L700W /..L900W
280	4	700 / 900	MEP-280L700W /..L900W
315	4	700 / 900	MEP-315L700W /..L900W
355	4	700 / 900	MEP-355L700W /..L900W
400	4	700 / 900	MEP-400L700W /..L900W
450	4	700 / 900	MEP-450L700W /..L900W
500	6	700 / 900	MEP-500L700W /..L900W
520	6	700 / 900	MEP-520L700W /..L900W
560	6	700 / 900	MEP-560L700W /..L900W
630	6	700 / 900	MEP-630L700W /..L900W
710	8	700 / 900	MEP-710L700W /..L900W
800	8	700 / 900	MEP-800L700W /..L900W
900	8	700 / 900	MEP-900L700W /..L900W
1000	8	700 / 900	MEP-1000L700W /..L900W
1100	8	700 / 900	MEP-1100L700W /..L900W
1200	8	700 / 900	MEP-1200L700W /..L900W

***The 900mm long coupling is used as repair joint**

The base for MEP joints is the polyethylene plate with dimensions that are precisely adjusted to the diameter of the jacket pipe. Electro-fusion welding open (plate type) joint can be placed on the pre-insulated pipeline after joining the steel pipes with welds. This makes them a perfect solution for repairs. The MEP joints are suited to every soil conditions, including contamination with oil products. Recommended for use in case of high level of ground water, large number of axial transitions, acidic soils, waste storage sites, etc. The electro-fusion welding MEP joints can be used with constant ground water levels of 0.5m above the top of pre-insulated pipe.

Note: sealing tightness tests shall be performed prior to filling with PUR foam.

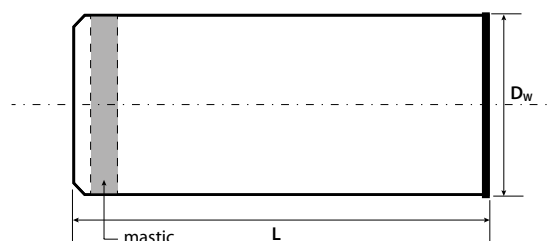
The MEP joint set contains:

- polyethylene plate
- ventilation plugs – 2 pieces
- weldable plugs – 2 pieces



Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.14 MTK1 heat-shrinkable end-joints with mastic



JACKET PIPE external diameter Dz: [mm]	MTK1 END JOINT +max internal diameter Dw: [mm]	MTK1 END JOINT Std wall thickness after shrinking s: [mm]	MTK1 END JOINT min length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	500	MTK1-090L500W-150
110	127 ⁺⁵	3,0	500	MTK1-110L500W-150
125	141 ⁺⁵	3,0	500	MTK1-125L500W-150
140	158 ⁺⁵	3,0	500	MTK1-140L500W-150
160	178 ⁺⁵	3,0	500	MTK1-160L500W-150
180	197 ⁺⁵	3,0	500	MTK1-180L500W-150
200	222 ⁺¹⁰	3,2	500	MTK1-200L500W-150
225	249 ⁺¹⁰	3,4	500	MTK1-225L500W-150
250	274 ⁺¹⁰	3,6	500	MTK1-250L500W-150
280	304 ⁺¹⁰	3,9	500	MTK1-280L500W-150
315	341 ⁺¹⁰	4,1	500	MTK1-315L500W-150
355	382 ⁺¹⁰	4,5	500	MTK1-355L500W-150
400	430 ⁺¹⁵	4,8	500	MTK1-400L500W-225
450	480 ⁺¹⁵	5,2	500	MTK1-450L500W-225
500	535 ⁺¹⁵	5,6	500	MTK1-500L500W-225
520	555 ⁺¹⁵	5,8	500	MTK1-520L500W-225
560	595 ⁺¹⁵	6,0	500	MTK1-560L500W-225
630	665 ⁺²⁰	6,6	500	MTK1-630L500W-225
670	705 ⁺²⁰	6,9	500	MTK1-670L500W-225
710	750 ⁺²⁰	7,2	500	MTK1-710L500W-225
780	820 ⁺²⁰	7,8	500	MTK1-780L500W-225
800	845 ⁺²⁰	7,9	500	MTK1-800L500W-225
900	945 ⁺²⁰	8,7	500	MTK1-900L500W-225
950	995 ⁺²⁰	9,1	500	MTK1-950L500W-225
1000	1045 ⁺²⁰	9,4	500	MTK1-1000L500W-225
1100	1150 ⁺²⁵	10,2	500	MTK1-1100L500W-225
1200	1250 ⁺²⁵	11,0	500	MTK1-1200L500W-225
1300	1355 ⁺³⁰	11,8	500	MTK1-1300L500W-225
1400	1460 ⁺³⁰	12,5	500	MTK1-1400L500W-225

* Joints' diameter tolerance +/- 1,0mm

** Joints' length tolerance +/-10mm

***Other diameters and lengths of joints and collars available on request

**** Joints are also available in cross-linked version with mastic and hot-melt adhesive.

End joints are used in spots in which the pipeline ends with a bottom. The end of the joint is to be shrunk with use of delicate gas burner flame. In case of encapsulation with of PUR insulation shells, shrink the joint on the entire length.

Set of MTK1 joint contains:

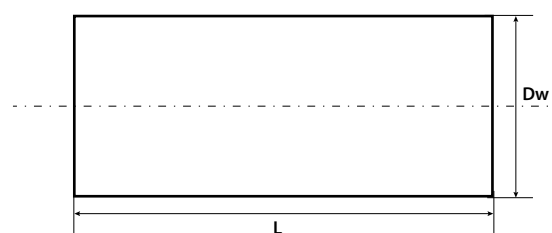
- heat-shrinkable end-joint with pre-applied mastic
- ventilation plug – 1 piece
- welding plug – 1 piece



MTK1 joints wrapped in white LDPE film and should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport must not exceed 35°C.

Additional accessories: during assembly of the joints components of polyurethane foam (PUR) are to be used. When ordering please provide information if the joints are to be delivered together with PUR foam.

8.1.15 Sliding sleeve MP



JACKET PIPE external diameter Dz: [mm]	Sliding sleeve MP internal diameter Dw: [mm]	Sliding sleeve MP wall thickness s: [mm]	Sliding sleeve MP length L: [mm]	CATALOGUE No.
63	69	3,0 ^{+0,5}	600/700	MP-063L600/..L700
75	84	3,0 ^{+0,5}	600/700	MP-075L600/..L700
90	96	3,0 ^{+0,5}	600/700	MP-090L600/..L700
110	115	3,0 ^{+1,0}	600/700	MP-110L600/..L700
125	131	3,0 ^{+1,0}	600/700	MP-125L600/..L700
140	147	3,0 ^{+1,0}	600/700	MP-140L600/..L700
160	169	3,0 ^{+1,0}	600/700	MP-160L600/..L700
180	189	3,0 ^{+1,0}	600/700	MP-180L600/..L700
200	209	3,2 ^{+1,3}	600/700	MP-200L600/..L700
225	235	3,4 ^{+1,3}	600/700	MP-225L600/..L700
250	262	3,6 ^{+1,3}	600/700	MP-250L600/..L700
280	290	3,9 ^{+1,3}	600/700	MP-280L600/..L700
315	328	4,1 ^{+1,5}	600/700	MP-315L600/..L700
355	366	4,5 ^{+2,0}	600/700	MP-355L600/..L700
400	413	4,8 ^{+2,2}	600/700	MP-400L600/..L700
450	464	5,2 ^{+2,5}	600/700	MP-450L600/..L700
500	509	5,6 ^{+2,5}	600/700	MP-500L600/..L700
520	540	8,6 ^{+2,5}	600/700	MP-520L600/..L700

* Length tolerance : +/- 1,0 mm

** Other lengths and diameters of sliding sleeves available on request

The sliding sleeves MP are to be used as:

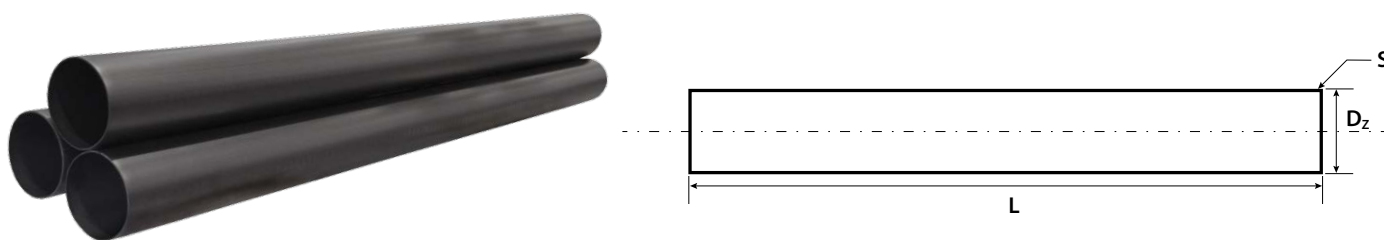
- Regular joints to be used together with two heat-shrinkable, cross-linked collars (TPSM-PE), or with two UNI-sleeves
- Repair joints, that once cut longitudinally can be welded again by an extruder, together with heat-shrinkable cross-linked tape RJS-E or with two UNI-sleeves
- Atypical joints, that can be freely cut and drilled for welding plugs, in any spot desired

MP sleeves shall be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport must not exceed 35°C.

On customer's demand MP sleeves could be wrapped in white LDPE foil (MP+F)

8.2 CEGA jacket pipes for pre-insulation.

8.2.1 CEGA jacket pipes for pre-insulation acc. to PN-EN 253:2020-01, with corona treatment.



JACKET PIPE external diameter Dz: [mm]	Wall thickness s: [mm]	Pipe length L: [mm]	CATALOGUE No.
90	3,0	5700 / 11700	RP-090L5700 / ..L11700
110	3,0	5700 / 11700	RP-110L5700 / ..L11700
125	3,0	5700 / 11700	RP-125L5700 / ..L11700
140	3,0	5700 / 11700	RP-140L5700 / ..L11700
160	3,0	5700 / 11700	RP-160L5700 / ..L11700
180	3,0	5700 / 11700	RP-180L5700 / ..L11700
200	3,2	5700 / 11700	RP-200L5700 / ..L11700
225	3,4	5700 / 11700	RP-225L5700 / ..L11700
250	3,6	5700 / 11700	RP-250L5700 / ..L11700
280	3,9	5700 / 11700	RP-280L5700 / ..L11700
315	4,1	5700 / 11700	RP-315L5700 / ..L11700
355	4,5	5700 / 11700	RP-355L5700 / ..L11700
400	4,8	5700 / 11700	RP-400L5700 / ..L11700
450	5,2	5700 / 11700	RP-450L5700 / ..L11700
500	5,6	5700 / 11700	RP-500L5700 / ..L11700
520	5,8	5700 / 11700	RP-520L5700 / ..L11700
560	6,0	5700 / 11700	RP-560L5700 / ..L11700
630	6,6	5700 / 11700	RP-630L5700 / ..L11700
710	7,2	5700 / 11700	RP-710L5700 / ..L11700
800	7,9	5700 / 11700	RP-800L5700 / ..L11700
900	8,7	5700 / 11700	RP-900L5700 / ..L11700
1000	9,4	5700 / 11700	RP-1000L5700 / ..L11700
1100	10,2	5700 / 11700	RP-1100L5700 / ..L11700
1200	11,0	5700 / 11700	RP-1200L5700 / ..L11700

***Other pipe lengths and diameters available on request**

****Length tolerance ± 10 mm**

In order to reduce circumferential and longitudinal stresses in the jacket pre-insulated pipe CEGA uses innovative manufacturing technology leading to:

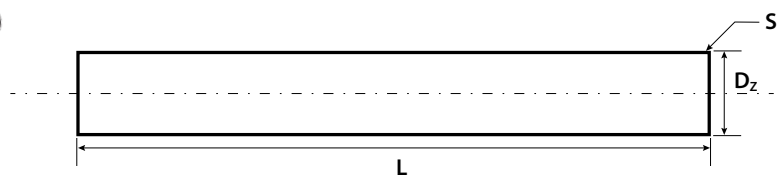
1. $\leq 0.5\%$ reduction of longitudinal stresses, according to EN ISO 2505
2. $\leq 0.1\%$ reduction of circumferential stresses, according to EN ISO 2505

Usage of "de-stressed" with corona treatment jacket pipes have the following effects:

- minimizes the risk of "tearing off" foam from the jacket pipe, which is critical for quality of pre-insulated pipe during its usage,
- seriously reduces the stresses in the jacket pipe, which lowers the risk of stress-induced corrosion, ie. its cracking during use of district-heating pipeline.

Note: Reduction of longitudinal and circumferential stress is out-of standard and can be done upon customer's demand.

8.2.2 CEGA jacket pipes PE-UV type for pre-insulation acc. to PN-EN 253:2020-01, with corona treatment, UV resistant.



JACKET PIPE PE-UV external diameter Dz: [mm]	Wall thickness s: [mm]	Pipe length L: [mm]	CATALOGUE No.
90	3,0	5700 / 11700	RPuv-1C090L5700 / ..L11700
110	3,0	5700 / 11700	RPuv-1C110L5700 / ..L11700
125	3,0	5700 / 11700	RPuv-1C125L5700 / ..L11700
140	3,0	5700 / 11700	RPuv-1C140L5700 / ..L11700
160	3,0	5700 / 11700	RPuv-1C160L5700 / ..L11700
180	3,0	5700 / 11700	RPuv-1C180L5700 / ..L11700
200	3,2	5700 / 11700	RPuv-1C200L5700 / ..L11700
225	3,4	5700 / 11700	RPuv-1C225L5700 / ..L11700
250	3,6	5700 / 11700	RPuv-1C250L5700 / ..L11700
280	3,9	5700 / 11700	RPuv-1C280L5700 / ..L11700
315	4,1	5700 / 11700	RPuv-1C315L5700 / ..L11700
355	4,5	5700 / 11700	RPuv-1C355L5700 / ..L11700
400	4,8	5700 / 11700	RPuv-1C400L5700 / ..L11700
450	5,2	5700 / 11700	RPuv-1C450L5700 / ..L11700
500	5,6	5700 / 11700	RPuv-1C500L5700 / ..L11700
520	5,8	5700 / 11700	RPuv-1C520L5700 / ..L11700
560	6,0	5700 / 11700	RPuv-1C560L5700 / ..L11700
630	6,6	5700 / 11700	RPuv-1C630L5700 / ..L11700
710	7,2	5700 / 11700	RPuv-1C710L5700 / ..L11700
800	7,9	5700 / 11700	RPuv-1C800L5700 / ..L11700
900	8,7	5700 / 11700	RPuv-1C900L5700 / ..L11700
1000	9,4	5700 / 11700	RPuv-1C1000L5700 / ..L11700
1100	10,2	5700 / 11700	RPuv-1C1100L5700 / ..L11700
1200	11,0	5700 / 11700	RPuv-1C1200L5700 / ..L11700

***Other pipe lengths and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

PE-UV jacket pipes are made of „HDPE100+“ row material containing over 2% of very well dispersed carbon black as well as UV stabilizer and squash, so that these pipes are high UV resistant for 20 years exploitation.

The solar radiation intensity meaning various lifetime of the materials exposed for sunshine light in different Earth zones is diverse and is expressed in kiloLangley „kLy“. For Central Europe (including Poland) it is assumed an unit value of 100 kLy per an area unit, during one year, that makes a value of 2000 kLy over 20 years of an exploitation.

8.2.3 CEGA jacket pipes PE-AS type for pre-insulation acc. to PN-EN 253:2020-01, antistatic.



JACKET PIPE PE-AS external diameter Dz: [mm]	Wall thickness s: [mm]	Pipe length L: [mm]	CATALOGUE No.
90	3,0	5700 / 11700	RPa-1C090L5700 / ..L11700
110	3,0	5700 / 11700	RPa-1C110L5700 / ..L11700
125	3,0	5700 / 11700	RPa-1C125L5700 / ..L11700
140	3,0	5700 / 11700	RPa-1C140L5700 / ..L11700
160	3,0	5700 / 11700	RPa-1C160L5700 / ..L11700
180	3,0	5700 / 11700	RPa-1C180L5700 / ..L11700
200	3,2	5700 / 11700	RPa-1C200L5700 / ..L11700
225	3,4	5700 / 11700	RPa-1C225L5700 / ..L11700
250	3,6	5700 / 11700	RPa-1C250L5700 / ..L11700
280	3,9	5700 / 11700	RPa-1C280L5700 / ..L11700
315	4,1	5700 / 11700	RPa-1C315L5700 / ..L11700
355	4,5	5700 / 11700	RPa-1C355L5700 / ..L11700
400	4,8	5700 / 11700	RPa-1C400L5700 / ..L11700
450	5,2	5700 / 11700	RPa-1C450L5700 / ..L11700
500	5,6	5700 / 11700	RPa-1C500L5700 / ..L11700
520	5,8	5700 / 11700	RPa-1C520L5700 / ..L11700
560	6,0	5700 / 11700	RPa-1C560L5700 / ..L11700
630	6,6	5700 / 11700	RPa-1C630L5700 / ..L11700
710	7,2	5700 / 11700	RPa-1C710L5700 / ..L11700
800	7,9	5700 / 11700	RPa-1C800L5700 / ..L11700
900	8,7	5700 / 11700	RPa-1C900L5700 / ..L11700
1000	9,4	5700 / 11700	RPa-1C1000L5700 / ..L11700
1100	10,2	5700 / 11700	RPa-1C1100L5700 / ..L11700
1200	11,0	5700 / 11700	RPa-1C1200L5700 / ..L11700

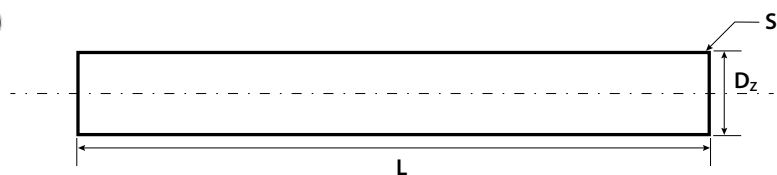
***Other pipe lengths and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

PE-AS jacket pipes are applied for pipe-line installations at the mining units, both onto the land as well as in the underground mine workings ie.: cuprum ore, silver, zink, lead, salt etc. They can also be used for other industrial applications.

PE-AS pipes are used for installation of different pipelines: technological, fire-fighting, air-condition, hydro-transport, drainage, etc.

8.2.4 CEGA jacket pipes PE-NP/AS type for pre-insulation acc. to PN-EN 253:2020-01, flame retardant, antistatic.



JACKET PIPE PE-NP/AS external diameter Dz: [mm]	Wall thickness s: [mm]	Pipe length L: [mm]	CATALOGUE No.
90	3,0	5700 / 11700	RPan-1C090L5700 / ..L11700
110	3,0	5700 / 11700	RPan-1C110L5700 / ..L11700
125	3,0	5700 / 11700	RPan-1C125L5700 / ..L11700
140	3,0	5700 / 11700	RPan-1C140L5700 / ..L11700
160	3,0	5700 / 11700	RPan-1C160L5700 / ..L11700
180	3,0	5700 / 11700	RPan-1C180L5700 / ..L11700
200	3,2	5700 / 11700	RPan-1C200L5700 / ..L11700
225	3,4	5700 / 11700	RPan-1C225L5700 / ..L11700
250	3,6	5700 / 11700	RPan-1C250L5700 / ..L11700
280	3,9	5700 / 11700	RPan-1C280L5700 / ..L11700
315	4,1	5700 / 11700	RPan-1C315L5700 / ..L11700
355	4,5	5700 / 11700	RPan-1C355L5700 / ..L11700
400	4,8	5700 / 11700	RPan-1C400L5700 / ..L11700
450	5,2	5700 / 11700	RPan-1C450L5700 / ..L11700
500	5,6	5700 / 11700	RPan-1C500L5700 / ..L11700
520	5,8	5700 / 11700	RPan-1C520L5700 / ..L11700
560	6,0	5700 / 11700	RPan-1C560L5700 / ..L11700
630	6,6	5700 / 11700	RPan-1C630L5700 / ..L11700
710	7,2	5700 / 11700	RPan-1C710L5700 / ..L11700
800	7,9	5700 / 11700	RPan-1C800L5700 / ..L11700
900	8,7	5700 / 11700	RPan-1C900L5700 / ..L11700
1000	9,4	5700 / 11700	RPan-1C1000L5700 / ..L11700
1100	10,2	5700 / 11700	RPan-1C1100L5700 / ..L11700
1200	11,0	5700 / 11700	RPan-1C1200L5700 / ..L11700

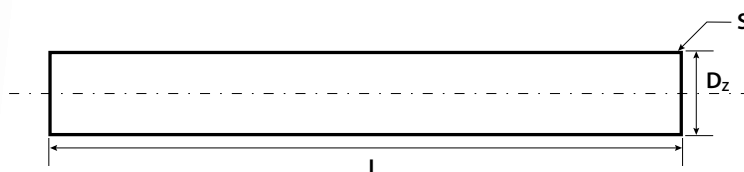
***Other pipe lengths and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

PE-NP/AS multi-layer jacket pipes are produced by co-extrusion (the layers are permanently interfused, and inseparable) to be used for installations at the mining units in chambers and the underground mine workings classified as „a“, „b“ and „c“ methane explosion risk as well as „A“ and „B“ coal-dust explosion risk.

PE-NP/AS pipes are used for installation of different pipelines: technological, fire-fighting, air-condition, hydro-transport, drainage, compressed air and neutral gases (inert gas), etc.

8.2.5 CEGA two-layer jacket pipes for pre-insulation with a colored outer layer acc. to PN-EN 253:2020-01, with corona treatment.



JACKET PIPE external diameter Dz: [mm]	Wall thickness s: [mm]	Pipe length L: [mm]	CATALOGUE No.
90	3,0	5700 / 11700	RPdb-090L5700 / ..L11700
110	3,0	5700 / 11700	RPdb-110L5700 / ..L11700
125	3,0	5700 / 11700	RPdb-125L5700 / ..L11700
140	3,0	5700 / 11700	RPdb-140L5700 / ..L11700
160	3,0	5700 / 11700	RPdb-160L5700 / ..L11700
180	3,0	5700 / 11700	RPdb-180L5700 / ..L11700
200	3,2	5700 / 11700	RPdb-200L5700 / ..L11700
225	3,4	5700 / 11700	RPdb-225L5700 / ..L11700
250	3,6	5700 / 11700	RPdb-250L5700 / ..L11700
280	3,9	5700 / 11700	RPdb-280L5700 / ..L11700
315	4,1	5700 / 11700	RPdb-315L5700 / ..L11700
355	4,5	5700 / 11700	RPdb-355L5700 / ..L11700
400	4,8	5700 / 11700	RPdb-400L5700 / ..L11700
450	5,2	5700 / 11700	RPdb-450L5700 / ..L11700
500	5,6	5700 / 11700	RPdb-500L5700 / ..L11700
520	5,8	5700 / 11700	RPdb-520L5700 / ..L11700
560	6,0	5700 / 11700	RPdb-560L5700 / ..L11700
630	6,6	5700 / 11700	RPdb-630L5700 / ..L11700
710	7,2	5700 / 11700	RPdb-710L5700 / ..L11700
800	7,9	5700 / 11700	RPdb-800L5700 / ..L11700
900	8,7	5700 / 11700	RPdb-900L5700 / ..L11700
1000	9,4	5700 / 11700	RPdb-1000L5700 / ..L11700
1100	10,2	5700 / 11700	RPdb-1100L5700 / ..L11700
1200	11,0	5700 / 11700	RPdb-1200L5700 / ..L11700

***Other pipe lengths and diameters available on request**

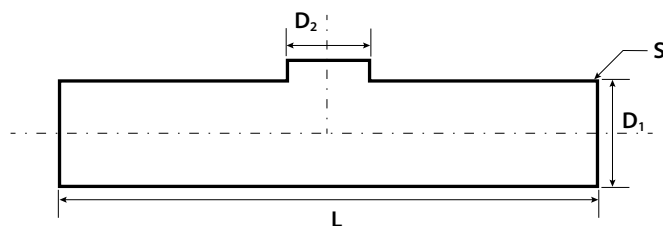
****Pipes may be produced also with other colour of the outer layer**

*****Supplementary to this system we offer joints made of material with the same technical properties and same colouring**

Two-layer pipes with a colored outer layer made in co-extrusion technology (layers are permanently connected, inseparable), are used to mark the type of transported medium in the pre-insulated pipe and/or to improve the aesthetics of the object in which they are installed.

May also be produced with antistatic outer layer.

8.3 TRPE - Main pipe with collar.



MAIN PIPE diameter D1: [mm]	Collar's external diameter D2: [mm]	Wall thickness s: [mm]	Main Pipe length L: [mm]	CATALOGUE NO.
90	90	3,6	700	TRPE-090090L700..1200
110	90	3,6	700	TRPE-110090L700..1200
110	110	3,6	700	TRPE-110110L700..1200
125	90	3,7	700	TRPE-125090L700..1200
125	110	3,7	700	TRPE-125110L700..1200
125	125	3,7	700	TRPE-125125L700..1200
140	90	4,0	700	TRPE-140090L700..1200
140	110	4,0	700	TRPE-140110L700..1200
140	125	4,0	700	TRPE-140125L700..1200
140	140	4,0	700	TRPE-140140L700..1200
160	90	4,5	700	TRPE-160090L700..1200
160	110	4,5	700	TRPE-160110L700..1200
160	125	4,5	700	TRPE-160125L700..1200
160	140	4,5	700	TRPE-160140L700..1200
160	160	4,5	700	TRPE-160160L700..1200
180	90	4,5	700	TRPE-180090L700..1200
180	110	4,5	700	TRPE-180110L700..1200
180	125	4,5	700	TRPE-180125L700..1200
180	140	4,5	700	TRPE-180140L700..1200
180	160	4,5	700	TRPE-180160L700..1200
180	180	4,5	700	TRPE-180180L700..1200
200	90	4,5	700	TRPE-200090L700..1200
200	110	4,5	700	TRPE-200110L700..1200
200	125	4,5	700	TRPE-200125L700..1200
200	140	4,5	700	TRPE-200140L700..1200
200	160	4,5	700	TRPE-200160L700..1200
200	180	4,5	700	TRPE-200180L700..1200
200	200	4,5	700	TRPE-200200L700..1200
225	90	5,0	700	TRPE-225090L700..1200
225	110	5,0	700	TRPE-225110L700..1200
225	125	5,0	700	TRPE-225125L700..1200
225	140	5,0	700	TRPE-225140L700..1200
225	160	5,0	700	TRPE-225160L700..1200
225	180	5,0	700	TRPE-225180L700..1200
225	200	5,0	700	TRPE-225200L700..1200
225	225	5,0	700	TRPE-225225L700..1200
250	90	5,5	700	TRPE-250090L700..1200

MAIN PIPE diameter D1: [mm]	Collar's external diameter D2: [mm]	Wall thickness s: [mm]	Main Pipe length L: [mm]	CATALOGUE NO.
250	110	5,5	700	TRPE-250110L700..1200
250	125	5,5	700	TRPE-250125L700..1200
250	140	5,5	700	TRPE-250140L700..1200
250	160	5,5	700	TRPE-250160L700..1200
250	180	5,5	700	TRPE-250180L700..1200
250	200	5,5	700	TRPE-250200L700..1200
250	225	5,5	700	TRPE-250225L700..1200
250	250	5,5	700	TRPE-250250L700..1200
280	90	6,2	700	TRPE-280090L700..1200
280	110	6,2	700	TRPE-280110L700..1200
280	125	6,2	700	TRPE-280125L700..1200
280	140	6,2	700	TRPE-280140L700..1200
280	160	6,2	700	TRPE-280160L700..1200
280	180	6,2	700	TRPE-280180L700..1200
280	200	6,2	700	TRPE-280200L700..1200
280	225	6,2	700	TRPE-280225L700..1200
280	250	6,2	700	TRPE-280250L700..1200
280	280	6,2	700	TRPE-280280L700..1200
315	90	6,2	700	TRPE-315090L700..1200
315	110	6,2	700	TRPE-315110L700..1200
315	125	6,2	700	TRPE-315125L700..1200
315	140	6,2	700	TRPE-315140L700..1200
315	160	6,2	700	TRPE-315160L700..1200
315	180	6,2	700	TRPE-315180L700..1200
315	200	6,2	700	TRPE-315200L700..1200
315	225	6,2	700	TRPE-315225L700..1200
315	250	6,2	700	TRPE-315250L700..1200
315	280	6,2	700	TRPE-315280L700..1200
315	315	6,2	700	TRPE-315315L700..1200
355*	90-315		700	TRPE-355090L700..1200
400*	90-315		700	TRPE-400090..400315L700..1200
450*	90-315		700	TRPE-450090..450315L700..1200
500*	90-315		700	TRPE-500090..500315L700..1200
560*	90-315		700	TRPE-560090..560315L700..1200
630*	90-315		700	TRPE-630090..630315L700..1200
710*	90-315		700	TRPE-710090..710315L700..1200
800*	90-315		700	TRPE-800090..800315L700..1200
900*	90-315		700	TRPE-900090..900315L700..1200

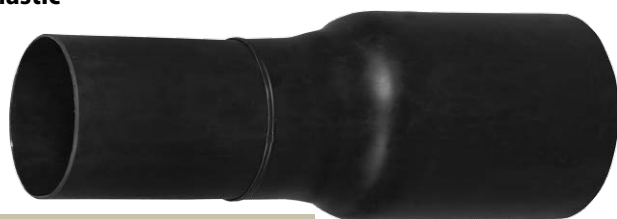
The main-pipes are also made in length 800mm, 900mm, 1200mm and other on request

***Main-pipes made upon request**

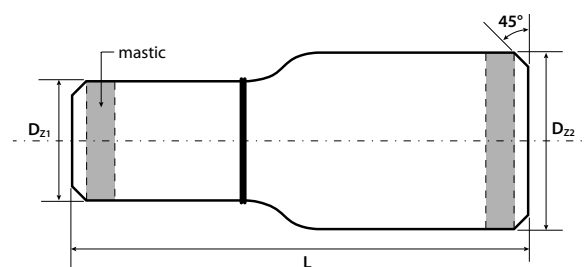
The main-pipes made of HDPE100 are used for production of pre-insulated valves and T-pieces.

8.4 Heat-shrinkable reducers.

8.4.1 Heat-shrinkable reducers **MTMr (straight shaped)** i **MTMrw bottle shaped (with welding)** with pre-applied mastic



MTMrw bottle shaped (with welding)



REDUCER Ext. diam. Dz1 / ext. diameter Dz2 [mm]	Length L: [mm]	CATALOGUE No.
90 / 110*	700	MTMr-090/110L700W
90 / 125	700	MTMrw-090/125L700W
90 / 140	700	MTMrw-090/140L700W
110 / 125*	700	MTMr-110/125L700W
110 / 140	700	MTMrw-110/140L700W
110 / 160	700	MTMrw-110/160L700W
125 / 140*	700	MTMr-125/140L700W
125 / 160	700	MTMrw-125/160L700W
125 / 180	700	MTMrw-125/180L700W
140 / 160*	700	MTMr-140/160L700W
140 / 180	700	MTMrw-140/180L700W
140 / 200	700	MTMrw-140/200L700W
160 / 180*	700	MTMr-160/180L700W
160 / 200	700	MTMrw-160/200L700W
160 / 225	700	MTMrw-160/225L700W
180 / 200*	700	MTMr-180/200L700W
180 / 225	700	MTMrw-180/225L700W
180 / 250	700	MTMrw-180/250L700W
200 / 225*	700	MTMr-200/225L700W
200 / 250	700	MTMrw-200/250L700W
200 / 280	700	MTMrw-200/280L700W
225 / 250*	700	MTMr-225/250L700W
225 / 280	700	MTMrw-225/280L700W
225 / 315	700	MTMrw-225/315L700W
250 / 280*	700	MTMr-250/280L700W
250 / 315	700	MTMrw-250/315L700W
250 / 355	700	MTMrw-250/355L700W
280 / 315*	700	MTMr-280/315L700W
280 / 355	700	MTMrw-280/355L700W
280 / 400	700	MTMrw-280/400L700W
315 / 355*	700	MTMr-315/355L700W
315 / 400	700	MTMrw-315/400L700W
315 / 450	700	MTMrw-315/450L700W
355 / 400*	700	MTMr-355/400L700W
355 / 450	700	MTMrw-355/450L700W
355 / 500	700	MTMrw-355/500L700W
400 / 450*	700	MTMr-400/450L700W
400 / 500	700	MTMrw-400/500L700W
400 / 560	700	MTMrw-400/560L700W
450 / 500*	700	MTMr-450/500L700W
450 / 560	700	MTMrw-450/560L700W
450 / 630	700	MTMrw-450/630L700W
500 / 560*	700	MTMr-500/560L700W
560 / 630*	700	MTMr-500/630L700W
630 / 710*	700	MTMr-630/710L700W

* **MTMr reducers covering two adjacent diameters are straight shaped**

** **Other diameters available upon request**

Set of MTMr or MTMrw reducer consists of:

- heat-shrinkable reducer with pre-applied mastic
- ventilation plugs – 2 pcs
- welding plugs – 2 pcs



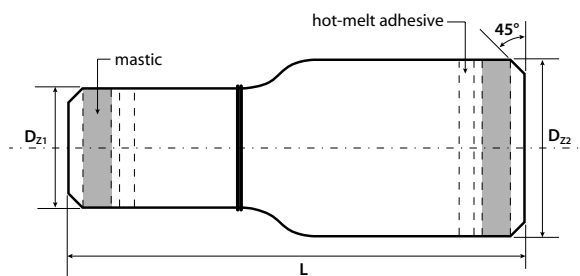
Reducers are wrapped in white LDPE foil and should be stored and transported in upright position. Maximal temperature during storage and transport must not exceed 35°C.

Additional accessories: during assembly of reducers components of polyurethane foam (PUR) are to be used. When ordering please provide information if the reducers are to be delivered together with PUR foam.

8.4.2 Heat-shrinkable reducers **MTX2r (straight shaped)** i **MTX2rw bottle shaped (with welding)** with pre-applied mastic and hot melt adhesive



MTX2rw bottle shaped (with welding)



REDUCER Ext. diam. Dz1 / ext. diameter Dz2 [mm]	Length L: [mm]	CATALOGUE No.
90 / 110*	700	MTX2r-090/110L700W
90 / 125	700	MTX2rw-090/125L700W
90 / 140	700	MTX2rw-090/140L700W
110 / 125*	700	MTX2r-110/125L700W
110 / 140	700	MTX2rw-110/140L700W
110 / 160	700	MTX2rw-110/160L700W
125 / 140*	700	MTX2r-125/140L700W
125 / 160	700	MTX2rw-125/160L700W
125 / 180	700	MTX2rw-125/180L700W
140 / 160*	700	MTX2r-140/160L700W
140 / 180	700	MTX2rw-140/180L700W
140 / 200	700	MTX2rw-140/200L700W
160 / 180*	700	MTX2r-160/180L700W
160 / 200	700	MTX2rw-160/200L700W
160 / 225	700	MTX2rw-160/225L700W
180 / 200*	700	MTX2r-180/200L700W
180 / 225	700	MTX2rw-180/225L700W
180 / 250	700	MTX2rw-180/250L700W
200 / 225*	700	MTX2r-200/225L700W
200 / 250	700	MTX2rw-200/250L700W
200 / 280	700	MTX2rw-200/280L700W
225 / 250*	700	MTX2r-225/250L700W
225 / 280	700	MTX2rw-225/280L700W
225 / 315	700	MTX2rw-225/315L700W
250 / 280*	700	MTX2r-250/280L700W
250 / 315	700	MTX2rw-250/315L700W
250 / 355	700	MTX2rw-250/355L700W
280 / 315*	700	MTX2r-280/315L700W
280 / 355	700	MTX2rw-280/355L700W
280 / 400	700	MTX2rw-280/400L700W
315 / 355*	700	MTX2r-315/355L700W
315 / 400	700	MTX2rw-315/400L700W
315 / 450	700	MTX2rw-315/450L700W
355 / 400*	700	MTX2r-355/400L700W
355 / 450	700	MTX2rw-355/450L700W
355 / 500	700	MTX2rw-355/500L700W
400 / 450*	700	MTX2r-400/450L700W
400 / 500	700	MTX2rw-400/500L700W
400 / 560	700	MTX2rw-400/560L700W
450 / 500*	700	MTX2r-450/500L700W
450 / 560	700	MTX2rw-450/560L700W
450 / 630	700	MTX2rw-450/630L700W
500 / 560*	700	MTX2r-500/560L700W
560 / 630*	700	MTX2r-500/630L700W
630 / 710*	700	MTX2r-630/710L700W

***MTX2r reducers covering two adjacent diameters are straight shaped**

****Other diameters available upon request**

Set of MTX2r or MTX2rw reducer consists of:

- cross-linked heat-shrinkable reducer with pre-applied mastic and hot melt adhesive
- ventilation plugs – 2 pcs
- welding plugs – 2 pcs

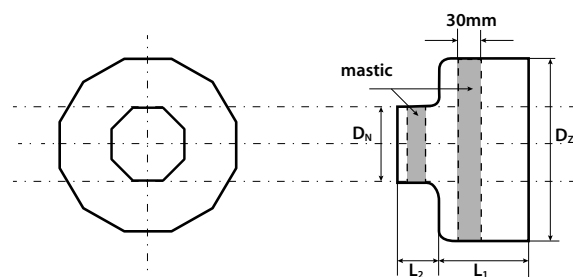


Reducers are wrapped in white LDPE foil and should be stored and transported in upright position. Maximal temperature during storage and transport must not exceed 35°C.

Additional accessories: during assembly of reducers components of polyurethane foam (PUR) are to be used. When ordering please provide information if the reducers are to be delivered together with PUR foam.

8.5 EC - cross-linked end caps.

8.5.1 ECS1 heat-shrinkable cross-linked end caps with mastic, for single pipes.



JACKET PIPE ECS1 external diameter D _z : [mm]	STEEL PIPE diameter DN: [mm]	Shrinkage on the jacket pipe max / min D _z _{max} / D _z _{min} : [mm]	Shrinkage on the steel pipe max / min D _N _{max} / D _N _{min} : [mm]	ECS dimensions L ₁ / L ₂ : [mm]	CATALOGUE No.
75	20	89 / 60	35 / 22	60 / 40	ECS1-075
90	25	102 / 70	40 / 25	60 / 40	ECS1-090
110	25	123 / 85	53 / 26	60 / 40	ECS1-110
	32				
	40				
125	40	138 / 95	64 / 40	60 / 40	ECS1-125
	50				
140	50	156 / 110	82 / 50	60 / 40	ECS1-140
	65				
160	65	177 / 120	96 / 52	80 / 50	ECS1-160
	80				
180	80	199 / 140	96 / 52	80 / 50	ECS1-180
200	80	219 / 140	122 / 52	80 / 50	ECS1-200
	100				
225	100	248 / 180	146 / 95	80 / 50	ECS1-225
	125				
250	125	275 / 195	178 / 95	80 / 50	ECS1-250
	150				
280	150	340 / 240	178 / 120	80 / 50	ECS1-280
315	150	345 / 240	232 / 120	80 / 50	ECS1-315
	200				
355	200	370 / 308	282 / 158	80 / 50	ECS1-355
400	200	415 / 308	282 / 158	80 / 50	ECS1-400
	250				
450	250	465 / 392	334 / 220	80 / 50	ECS1-450
	300				
500	300	515 / 445	364 / 275	100 / 70	ECS1-500
	350				
520	350	575 / 480	416 / 325	100 / 70	ECS1-520
	400				
560	350	575 / 480	416 / 325	100 / 70	ECS1-560
	400				
630	400	645 / 550	470 / 356	100 / 70	ECS1-630
	450				

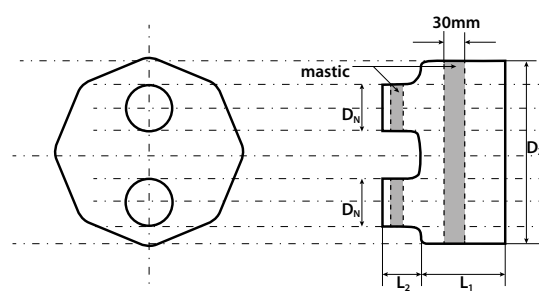
**The color marked ECS1 end caps for pre-insulated pipes with "Insulation plus"*

****Other diameters of ECS1 end caps available on request**

ECS1 end cap is designed to protect ends of pre-insulated pipes and PUR insulation from water/moisture penetration in chambers, district-heating nodes, basements, etc. It secures perfect sealing and easy and quick assembly.

Place the ECS1 end cap on the pre-insulated pipe prior to its connection to the internal installation and shrink both on the jacket pipe and on the carrier pipe (steel or plastic).

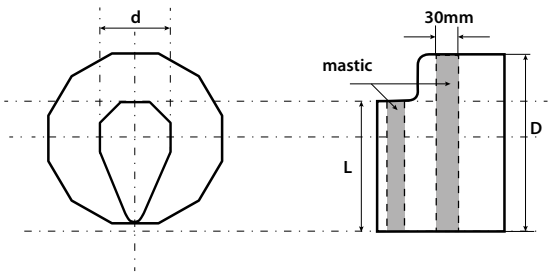
8.5.2 ECD1 heat-shrinkable, cross-linked end caps, for symmetric double pipes.



JACKET PIPE external diameter D_z : [mm]	Shrinkage on the jacket pipe max / min $D_{z_{max}} / D_{z_{min}}$: [mm]	Shrinkage on the steel pipe external max / min $D_{N_{max}} / D_{N_{min}}$: [mm]	APPLICATION		CATALOGUE No.
			jacket / steel pipe $D_z / 2 \times D_N$: [mm]	s : [mm]	
125	133 / 95	32 / 22	125 / 2 x 20		ECD1-125/20+20
140	150 / 110	32 / 22	140 / 2 x 20	18	ECD1-140/20+20
140	150 / 110	38 / 27	140 / 2 x 25	18	ECD1-140/25+25
160	170 / 120	28 / 27	160 / 2 x 25	18	ECD1-160/25+25
160	170 / 120	48 / 34	160 / 2 x 32	18	ECD1-160/32+32
160	170 / 120	54 / 39	160 / 2 x 40	18	ECD1-160/40+40
180	190 / 130	48 / 34	180 / 2 x 32	18	ECD1-180/32+32
180	190 / 130	54 / 39	180 / 2 x 40	18	ECD1-180/40+40
200	209 / 140	70 / 47	200 / 2 x 50	20	ECD1-200/50+50
225	234 / 180	70 / 47	225 / 2 x 50	20	ECD1-225/50+50
225	234 / 180	82 / 58	225 / 2 x 65	20	ECD1-225/65+65
250	260 / 195	82 / 58	250 / 2 x 65	20	ECD1-250/65+65
250	260 / 195	96 / 78	250 / 2 x 80	25	ECD1-250/80+80
280	290 / 215	96 / 78	280 / 2 x 80	25	ECD1-280/80+80
315	328 / 240	124 / 98	315 / 2 x 100	25	ECD1-315/100+100
355	370 / 260	124 / 98	355 / 2 x 100	25	ECD1-355/100+100
400	415 / 310	149 / 125	400 / 2 x 125	30	ECD1-400/125+125
450	465 / 390	149 / 125	450 / 2 x 125	30	ECD1-450/125+125
450	465 / 390	182 / 148	450 / 2 x 150	40	ECD1-450/150+150
500	520 / 465	182 / 148	500 / 2 x 150	40	ECD1-500/150+150
560	575 / 480	238 / 179	560 / 2 x 200	45	ECD1-560/200+200
630	655 / 530	238 / 179	630 / 2 x 200	45	ECD1-630/200+200

* The color marked ECD1 end caps for pre-insulated pipes with Insulation "plus type"

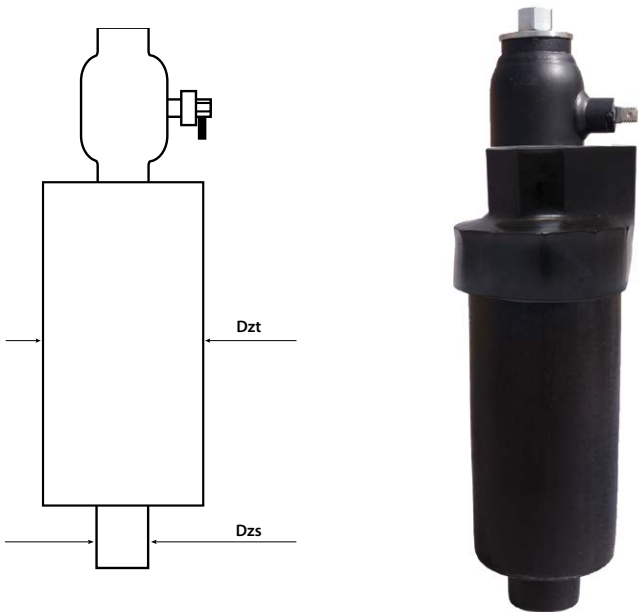
8.5.3 ECS1-Z heat-shrinkable cross-linked end caps with mastic, for valves.



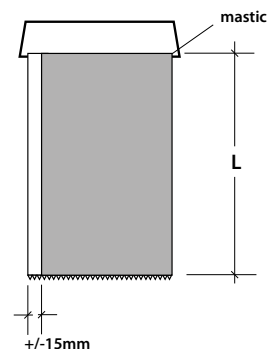
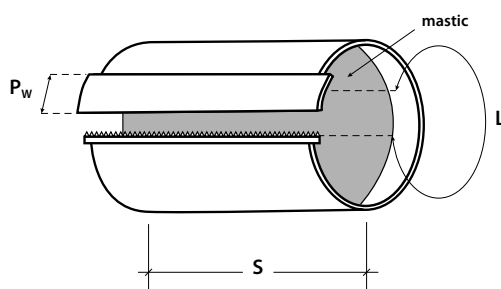
Service valve nominal diameter DN	Steel pipe valve outer diameter Dzs [mm]	HDPE jacket pipe of valve spindle insulation Dzt [mm]	ECS1-Z Dimensions			CATALOGUE No.
			D [mm]	d [mm]	L [mm]	
25	33,7	90	113	55	85	ECS1-Z090/25CL
25 / 32	33,7 / 42,4	110	118	61	93	ECS1-Z110/25CL
32 / 40	42,4 / 48,3	125	133	81	115	ECS1-Z125/32CL
40 / 50	48,3 / 60,3	140	150	94	128	ECS1-Z140/40CL
50	60,3	160	185	94	128	ECS1-Z160/50CL

**ECS1-Z dimensions tolerance +/-1mm*
***Other diameters available on request*

ECS1-Z are to be used to end-up of pre-insulated pipes in ball-valves for drainage and venting of the district-heating pipelines. **ECS1-Z** are effectively sealing and protecting against moisture penetration. **ECS1-Z** are resistant to UV, aggressive factors as well as fungus and mildews. They are with especially designed asymmetric shape allowing their application through the spindle of the valve.



8.5.4 ECZ1 heat-shrinkable, cross-linked, dividable (open) end caps, glass fiber reinforced, with a zipper, for single pipes.



JACKET PIPE external diameter Dz: [mm]	CARRIER PIPE diameter DN: [mm]	Diameter sizes ECZ1 Dz _{max} /dw _{min} : [mm]	ECZ1 length L: [mm]	CATALOGUE No.
90	25	110/26	220	ECZ1-110
	32			
110	25			
	32	125/48	180	ECZ1-125
125	40			
	50			
140	50	140/50	180	ECZ1-140
	65			
	65			
160	80	160/60	180	ECZ1-160
	80			
180	80			
	80	180/70	180	ECZ1-180
200	100			
	100			
225	125	225/89	220	ECZ1-225
	125			
250	150			
	150	250/108	220	ECZ1-250
280	150			
	150			
315	200	280/133	220	ECZ1-280
	200			
355	200			
	200	315/168	220	ECZ1-315
400	250			
	250			
450	300	355/219	270	ECZ1-355
	300			
500	350			
	350	400/219	270	ECZ1-400
520	400			
	400			
560	450	450/263	270	ECZ1-450
	450			
630	500			
	500	500/263	270	ECZ1-500
710	600			
	600			
800	700	520/263	270	ECZ1-520
	700			
900	800			
	800	560/263	270	ECZ1-560
1000	900			
	900			
1100	1000	630/355	350	ECZ1-630
	1000			
1200	1000			

* The color marked ECZ1 end caps for pre-insulated pipes with insulation "plus type"

Made of glass fiber reinforced cross-linked HDPE dividable (open) heat-shrinkable end cap with mastic, with high shrinking capabilities, with a zipper. Universal and easy to assembly.

To improve its sealing abilities and safety of the connection, its surface is fully coated by mastic except +/-15mm strip at one of the edge, so called an anti-slippage or anti-milking zone. This zone is to be positioned on top of the PE jacket pipe to prevent the ECZ1 from milking-off.

The ECZ1 end cap can be installed after completion of welding of pre-insulated pipes, or used as repair end-cap.

8.6 UNI-sleeves, radiation cross-linked wrap-around heat-shrinkable RJS tape coated with hot-melt adhesive strip and visco-elastic sealant, pre-cut to length, with pre-attached WPCP closure patch.



ITEM	width of the tape S [mm]	length of the tape L [mm]	pcs per 1 set	set consisting of	CATALOGUE No.
uni-sleeve 90	155	380	2	2 x (RJS155 L380mm + WPCP100x155mm)	TTD-090US
uni-sleeve 110	155	450	2	2 x (RJS155 L450mm + WPCP100x155mm)	TTD-110US
uni-sleeve 125	155	500	2	2 x (RJS155 L500mm + WPCP100x155mm)	TTD-125US
uni-sleeve 140	155	545	2	2 x (RJS155 L545mm + WPCP100x155mm)	TTD-140US
uni-sleeve 160	155	610	2	2 x (RJS155 L610mm + WPCP100x155mm)	TTD-160US
uni-sleeve 180	155	670	2	2 x (RJS155 L670mm + WPCP100x155mm)	TTD-180US
uni-sleeve 200	155	745	2	2 x (RJS155 L745mm + WPCP100x155mm)	TTD-200US
uni-sleeve 225	155	850	2	2 x (RJS155 L850mm + WPCP100x155mm)	TTD-225US
uni-sleeve 250	155	910	2	2 x (RJS155 L910mm + WPCP100x155mm)	TTD-250US
uni-sleeve 280	155	1000	2	2 x (RJS155 L1000mm + WPCP100x155mm)	TTD-280US
uni-sleeve 315	155	1120	2	2 x (RJS155 L1120mm + WPCP100x155mm)	TTD-315US
uni-sleeve 355	230	1250	2	2 x (RJS230 L1250mm + WPCP100x230mm)	TTD-355US
uni-sleeve 400	230	1400	2	2 x (RJS230 L1400mm + WPCP100x230mm)	TTD-400US
uni-sleeve 450	230	1570	2	2 x (RJS230 L1570mm + WPCP100x230mm)	TTD-450US
uni-sleeve 500	230	1720	2	2 x (RJS230 L1720mm + WPCP150x230mm)	TTD-500US
uni-sleeve 560	230	1970	2	2 x (RJS230 L1970mm + WPCP150x230mm)	TTD-560US
uni-sleeve 630	230	2190	2	2 x (RJS230 L2190mm + WPCP150x230mm)	TTD-630US
uni-sleeve 710	230	2450	2	2 x (RJS230 L2450mm + WPCP150x230mm)	TTD-710US
uni-sleeve 800	300	2805	2	2 x (RJS300 L2805mm + WPCP150x300mm)	TTD-800US
uni-sleeve 900	300	3150	2	2 x (RJS300 L3150mm + WPCP150x300mm)	TTD-900US
uni-sleeve 1000	300	3465	2	2 x (RJS300 L3465mm + WPCP150x300mm)	TTD-1000US

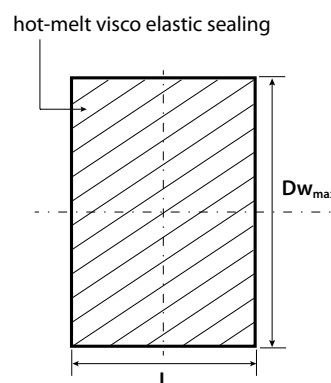
UNI-sleeve, precut-to-length for the respective pipe diameter RJS-E - radiation cross-linked premium class wrap-around heat-shrinkable tape (coated with hot-melt adhesive strip and visco-elastic sealant) with permanent change indicator on its external surface, with pre-attached closure patch WPCP.

UNI-sleeve is dedicated for the purpose of the additional sealing of the heat-shrinkable joints (so called double sealing).

The pre-attached WPCP closure patch on one of the ends of pre-cut to length RJS-E makes the installation of RJS-E shrinkable tape easier and faster, as well as improves its reliability.

During installation please follow CEGA's assembly instruction.

8.7 TPSM-PE heat-shrinkable, cross-linked collars with mastic.



JACKET PIPE external diameter Dz: [mm]	COLLAR diameter prior and / after shrinking Dw _{max} / Dw _{min} : [mm]	COLLAR length L: [mm]	CATALOGUE No.
90	115 / 80	150	OTW1-090L150
		225	OTW1-090L225
110	130 / 90	150	OTW1-110L150
		225	OTW1-110L225
125	155 / 100	150	OTW1-125L150
		225	OTW1-125L225
140	170 / 110	150	OTW1-140L150
		225	OTW1-140L225
160	190 / 125	150	OTW1-160L150
		225	OTW1-160L225
180	210 / 135	150	OTW1-180L150
		225	OTW1-180L225
200	225 / 145	150	OTW1-200L150
		225	OTW1-200L225
225	260 / 165	150	OTW1-225L150
		225	OTW1-225L225
250	290 / 185	150	OTW1-250L150
		225	OTW1-250L225
280	330 / 210	150	OTW1-280L150
		225	OTW1-280L225
315	370 / 235	150	OTW1-315L150
		225	OTW1-315L225
355	395 / 250	150	OTW1-355L150
		225	OTW1-355L225
400	450 / 285	150	OTW1-400L150
		225	OTW1-400L225
450	505 / 315	225	OTW1-450L225
500	555 / 350	225	OTW1-500L225
520	555 / 350	225	
560	625 / 385	225	OTW1-560L225
630	775 / 480	225	OTW1-710L225
710	775 / 480	225	
800	865 / 525	225	OTW1-800L225
** 900	970 / 780	225	OTW1-900L225
** 1000	1100 / 880	225	OTW1-1000L225

* Collars are also available in length L=450mm

** Collars diameters 900, 1000mm available on request

Heat-shrinkable cross-linked collars are equipped with hot-melt visco-elastic sealing. Easy and quick assembly, thanks to their pre-form as ready sleeve. Their surface is with a permanent change indicator (in form of the dimpled backing) disappearing in case of appropriate heating.

8.8 NTX3 cross-linked heat shrinkable sleeves with hot-melt adhesive



EXTERNAL PIPE DIAMETER with additional PE/PP cover Dz: [mm]	NTX3 SLEEVE +max internal diameter Dw: [mm]	NTX3 SLEEVE Std wall thickness after shrinking s: [mm]	NTX3 SLEEVE length L: [mm]	CATALOGUE No.
90	105 ⁺⁵	3,0	150	NTX3-090L150
110	127 ⁺⁵	3,0	150	NTX3-110L150
125	141 ⁺⁵	3,0	150	NTX3-125L150
140	158 ⁺⁵	3,0	150	NTX3-140L150
160	178 ⁺⁵	3,0	150	NTX3-160L150
180	197 ⁺⁵	3,0	200	NTX3-180L200
200	222 ⁺⁵	3,2	200	NTX3-200L200
225	249 ⁺⁵	3,4	200	NTX3-225L200
250	274 ⁺⁵	3,6	200	NTX3-250L200
280	304 ⁺⁵	3,9	200	NTX3-280L200
315	341 ⁺⁵	4,1	200	NTX3-315L200
355	382 ⁺⁵	4,5	300	NTX3-355L300
400	430 ⁺¹⁵	4,8	300	NTX3-400L300
450	480 ⁺¹⁵	5,2	300	NTX3-450L300
500	535 ⁺¹⁵	5,6	300	NTX3-500L300
560	595 ⁺¹⁵	6,0	300	NTX3-560L300
630	665 ⁺²⁰	6,6	300	NTX3-630L300
670	705 ⁺²⁰	6,9	350	NTX3-670L350
710	750 ⁺²⁰	7,2	350	NTX3-710L350
780	820 ⁺²⁰	7,8	350	NTX3-780L350
800	845 ⁺²⁰	7,9	350	NTX3-800L350
900	945 ⁺²⁰	8,7	350	NTX3-900L350
950	995 ⁺²⁰	9,1	350	NTX3-950L350
1000	1045 ⁺²⁰	9,4	350	NTX3-1000L350
1100	1150 ⁺²⁵	10,2	350	NTX3-1100L350
1200	1250 ⁺²⁵	11,0	350	NTX3-1200L350
1300	1355 ⁺³⁰	11,8	350	NTX3-1300L350
1400	1460 ⁺³⁰	12,5	350	NTX3-1400L350

* Joints' diameter tolerance +/- 1,0mm

* Joints' length tolerance +/- 10mm

** Other lengths of NTX3 joints available on request

NTX3 sleeves with hot-melt adhesive, made of cross-linked HDPE100 are to be used to protect connections (welds) of pressure RC (resistance to cracks) pipes with additional external PE or PP cover of the: Tytan PE/PP, RC MAXIprotect®, SLM, Robust Superpipe types, reinforced Elplast+ pipes and similar. In case of products with detection metal tape they additionally protect the wiring connections from humidity and corrosion. **NTX3** are UV, light and aggressive factors resistant. **NTX3** sleeves by cross-linking, have extended shape memory, which together with a layer of hot-melt adhesive placed on internal surface of product, secures full tightness after shrinking and protection with very high resistance parameters. The ends of sleeve are phased, which increases their resistance for breaking off the pipe during its axial movement in the soil.

Thanks to innovative manufacturing technology that causes regular distribution of strains on entire surface of the sleeve there is no need to center the sleeve during assembly, and high shrinking speed of **NTX3**, compared to other market solutions allows for time savings during installation.

NTX3 are wrapped in white LDPE foil and should be stored and transported in upright position to avoid ovalization. Maximal temperature during storage and transport must not exceed 35°C.

8.9 Polyurethane foams

8.9.1 PUR CEGA foam-bags and foam-kits (bottled)

CEGA break-bulked PUR foams in multilayer plastic bags providing an anti-diffusion barrier or in bottles in pairs are factory sets containing liquid components that, after mixing with each other and pouring into the joint, fill it completely, creating PUR insulation. Both components (polyol A and isocyanate B) are packed in volumes that secure the right mixing ratio in order to properly fill the joint.

CEGA foam-bags and foam-kits (bottled) in pairs meet the requirements of PN-EN 489: 2020

PUR foams-bags are delivered in polystyrene insulation boxes, in which storage instruction and guide of proper PUR doses selection for particular junction are placed.



The scheme of PUR doses standardization for foam-bags and foam-kits (bottled) is specified in below table:

Foam-bag or foam-kit number	Quantity per styrobox [pcs]	Total volume [L]
0	20	0,17
0,5	20	0,23
1	20	0,32
2	20	0,40
3	18	0,50
4	16	0,60
5	14	0,75
6	12	0,90
7	12	1,10
8	10	1,30
9	7	1,50
10	7	2,00
11	7	2,50
12	7	3,00
13	5	3,50
14	3	4,50
15	3	5,00

In case of lack of a proper foam-bag for a given junction, it can be replaced by replacements composed of several other bags, as shown in the table below foam-bag Nw:

Foam-bag or foam-kit (bottled) number	Replacements of foam-bag number
1	2x0
2	0+0,5
3	0+1
4	0,5+2
5	0+4
6	1+4 ; 2+3
7	0,5+6 ; 3+4
8	0,5+7 ; 2+6
9	2x5 ; 2+7 ; 4+6
10	3+9 ; 6+7
11	3+10
12	2x9 ; 3+11
13	3+12 ; 9+10
14	3x9 ; 9+12 ; 10+11 ; 3+2x10
15	2x11 ; 3+14 ; 9+13 ; 10+12 ; 2x9+10

8.9.2 Proper selection of PUR – MTM heat shrinkable joints, MTX2 heat shrinkable radiation cross-linked joints, MEZ electro-fusion welding, sliding (closed) joints

Standard insulation foaming length $L_w=340\text{mm}$			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits number	CATALOGUE No.
90	20	0,5	PURSw-090/20L320 PURS-090...
90	25	0,5	PURSw-090/25L320 PURS-090...
110	32	1	PURSw-110/32L320 PURS-110...
110	40	1	PURSw-110/40L320 PURS-110...
125	50	1	PURSw-125/50L320 PURS-125...
140	65	2	PURSw-140/65L320 PURS-140...
160	80	3	PURSw-160/80L320 PURS-160...
180	80	4	PURSw-180/80L320 PURS-180...
200	100	5	PURSw-200/100L320 PURS-200...
225	125	6	PURSw-225/125L320 PURS-225...
250	150	6	PURSw-250/150L320 PURS-250...
280	150	8	PURSw-280/150L320 PURS-280...
315	200	9	PURSw-315/200L320 PURS-315...
355	200	10	PURSw-355/200L320 PURS-355...
400	250	11	PURSw-400/250L320 PURS-400...
450	300	2x8	PURSw-450/300L320 PURS-450...
500	350	8+10	PURSw-500/350L320 PURS-500...
560	400	6+12	PURSw-560/400L320 PURS-560...
560	450	12	PURSw-560/450L320 PURS-560...
630	450	15	PURSw-560/450L320 PURS-560...
630	500	2x10	PURSw-630/500L320 PURS-630...

**Other diameters available on request*

Standard insulation foaming length $L_w=440\text{mm}$			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits number	CATALOGUE No.
90	20	1	PURSw-090/20L440 PURS-090...
90	25	1	PURSw-090/25L440 PURS-090...
110	32	2	PURSw-110/32L440 PURS-110...
110	40	2	PURSw-110/40L440 PURS-110...
125	50	2	PURSw-125/50L440 PURS-125...
140	65	3	PURSw-140/65L440 PURS-140...
160	80	4	PURSw-160/80L440 PURS-160...
180	80	5	PURSw-180/80L440 PURS-180...
200	100	6	PURSw-200/100L440 PURS-200...
225	125	7	PURSw-225/125L440 PURS-225...
250	150	8	PURSw-250/150L440 PURS-250...
280	150	5+6	PURSw-280/150L440 PURS-280...
315	200	2x6	PURSw-315/200L440 PURS-315...
355	200	11	PURSw-355/200L440 PURS-355...
400	250	12	PURSw-400/250L440 PURS-400...
450	300	13	PURSw-450/300L440 PURS-450...
500	350	14	PURSw-500/350L440 PURS-500...
560	400	2x11	PURSw-560/400L440 PURS-560...
560	450	2x10	PURSw-560/450L440 PURS-560...
630	450	8+15	PURSw-560/450L440 PURS-560...
630	500	15	PURSw-630/500L440 PURS-630...

**Other diameters available on request*

Proper selection of PUR – MTM heat shrinkable joints, MTX2 heat shrinkable radiation cross-linked joints, MEZ electro-fusion welding, sliding (closed) joints

Insulation PLUS foaming length $L_w=340\text{mm}$			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits number	CATALOGUE No.
110	20	1	PURPw-110/20L320 PURP-110...
110	25	1	PURPw-110/25L320 PURP-110...
125	32	2	PURPw-125/32L320 PURP-125...
125	40	2	PURPw-125/40L320 PURP-125...
140	50	3	PURPw-140/50L320 PURP-140...
160	65	3	PURPw-160/65L320 PURP-160...
180	80	4	PURPw-180/80L320 PURP-180...
200	80	6	PURPw-200/80L320 PURP-200...
225	100	7	PURPw-225/100L320 PURP-225...
250	125	7	PURPw-250/125L320 PURP-250...
280	150	8	PURPw-280/150L320 PURP-280...
315	150	2x6	PURPw-315/150L320 PURP-315...
355	200	10	PURPw-355/200L320 PURP-355...
400	200	12	PURPw-400/200L320 PURP-400...
450	250	5+11	PURPw-450/250L320 PURP-450...
500	300	5+12	PURPw-500/300L320 PURP-500...
560	350	14	PURPw-560/350L320 PURP-560...
560	400	6+12	PURPw-560/400L320 PURP-560...
630	400	5+15	PURPw-630/400L320 PURP-630...
630	450	15	PURPw-630/450L320 PURP-630...
670	450	2x12	PURPw-670/450L320 PURP-670...

***Other diameters available on request**

Insulation PLUS foaming length $L_w=440\text{mm}$			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits number	CATALOGUE No.
110	20	2	PURPw-110/20L440 PURP-110...
110	25	2	PURPw-110/25L440 PURP-110...
125	32	3	PURPw-125/32L440 PURP-125...
125	40	3	PURPw-125/40L440 PURP-125...
140	50	4	PURPw-140/50L440 PURP-140...
160	65	2x1	PURPw-160/65L440 PURP-160...
180	80	2x2	PURPw-180/80L440 PURP-180...
200	80	7	PURPw-200/80L440 PURP-200...
225	100	8	PURPw-225/100L440 PURP-225...
250	125	9	PURPw-250/125L440 PURP-250...
280	150	5+6	PURPw-280/150L440 PURP-280...
315	150	5+9	PURPw-315/150L440 PURP-315...
355	200	11	PURPw-355/200L440 PURP-355...
400	200	5+12	PURPw-400/200L440 PURP-400...
450	250	7+12	PURPw-450/250L440 PURP-450...
500	300	8+13	PURPw-500/300L440 PURP-500...
560	350	2x12	PURPw-560/350L440 PURP-560...
560	400	2x11	PURPw-560/400L440 PURP-560...
630	400	12+14	PURPw-630/400L440 PURP-630...
630	450	8+15	PURPw-630/450L440 PURP-630...
670	450	12+14	PURPw-670/450L440 PURP-670...

***Other diameters available on request**

8.9.3 Proper selection of PUR – flexible elbow joints with shrinkable ends (Flexbends)

Insulation standard, PLUS and PLUS+, overlap on the jacket pipe L:120mm				
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits (bottled)	Foaming length L _w : [mm]	CATALOGUE No.
90	20/26,9	4	740	PURFw-090/20L740 PURF-090...
90	25/33,7	4	740	PURFw-090/25L740 PURF-090...
110	20/26,9	5	740	PURFw-110/20L740 PURF-110...
110	25/33,7	5	740	PURFw-110/25L740 PURF-110...
110	32/42,4	5	740	PURFw-110/32L740 PURF-110...
110	40/48,3	5	740	PURFw-110/40L740 PURF-110...
125	20/26,9	7	810	PURFw-125/20L810 PURF-125...
125	25/33,7	2x3	810	PURFw-125/25L810 PURF-125...
125	32/42,4	2x3	810	PURFw-125/32L810 PURF-125...
125	40/48,3	2x3	810	PURFw-125/40L810 PURF-125...
125	50/60,3	6	810	PURFw-125/50L810 PURF-125...
140	32/42,4	2x4	810	PURFw-140/32L810 PURF-140...
140	40/48,3	2x4	810	PURFw-140/40L810 PURF-140...
140	50/60,3	7	810	PURFw-140/50L810 PURF-140...
140	65/76,1	7	810	PURFw-140/65L810 PURF-140...
160	32/42,4	3+7	810	PURFw-160/32L810 PURF-160...
160	40/48,3	3+7	810	PURFw-160/40L810 PURF-160...
160	50/60,3	9	810	PURFw-160/50L810 PURF-160...
160	65/76,1	9	810	PURFw-160/65L810 PURF-160...
160	80/88,9	8	810	PURFw-160/80L810 PURF-160...
180	50/60,3	4+8	810	PURFw-180/50L810 PURF-180...
180	65/76,1	2x6	810	PURFw-180/65L810 PURF-180...
180	80/88,9	4+7	810	PURFw-180/80L810 PURF-180...
200	65/76,1	2x8	880	PURFw-200/65L880 PURF-200...
200	80/88,9	11	880	PURFw-200/80L880 PURF-200...
200	100/114,3	5+9	880	PURFw-200/100L880 PURF-200...
225	80/88,9	13	980	PURFw-225/80L980 PURF-225...
225	100/114,3	5+11	980	PURFw-225/100L980 PURF-225...
225	125/139,7	6+10	980	PURFw-225/125L980 PURF-225...
250	100/114,3	14	1100	PURFw-250/100L1100 PURF-250...
250	125/139,7	7+12	1100	PURFw-250/125L1100 PURF-250...
250	150/168,3	9+10	1100	PURFw-250/150L1100 PURF-250...

* foam-bags doses for diameters 280, 315, 355, 400 in pipeline

8.9.4 Proper selection of PUR – MEP and Ewelcon open (plate type) electro-fusion welding joints

Standard insulation foaming length Lw=440mm			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits (bottled)	CATALOGUE No.
90	20	0,5	PURSw-090/20L440 PURS-090...
90	25	0	PURSw-090/25L440 PURS-090...
110	32	0,5	PURSw-110/32L440 PURS-110...
110	40	0,5	PURSw-110/40L440 PURS-110...
125	50	1	PURSw-125/50L440 PURS-125...
140	65	2	PURSw-140/65L440 PURS-140...
160	80	3	PURSw-160/80L440 PURS-160...
180	80	4	PURSw-180/80L440 PURS-180...
200	100	5	PURSw-200/100L440 PURS-200...
225	125	6	PURSw-225/125L440 PURS-225...
250	150	6	PURSw-250/150L440 PURS-250...
280	150	8	PURSw-280/150L440 PURS-280...
315	200	8	PURSw-315/200L440 PURS-315...
355	200	10	PURSw-355/200L440 PURS-355...
400	250	2x7	PURSw-400/250L440 PURS-400...
450	300	11	PURSw-450/300L440 PURS-450...
500	350	7+10	PURSw-500/350L440 PURS-500...
520	400	5+10	PURSw-520/400L440 PURS-520...
560	450	5+10	PURSw-560/450L440 PURS-560...
630	500	13	PURSw-630/350L440 PURS-630...
800	600	11+14	PURSw-800/600L440 PURS-800...
800	700	13	PURSw-800/700L440 PURS-800...
900	700	13+14	PURSw-900/500L440 PURS-900...
1000	800	2x14	PURSw-1000/800L440 PURS-1000...
1100	900	2x15	PURSw-1100/900L440 PURS-1100...

***Other diameters available on request**

Proper selection of PUR – MEP and Ewelcon open (plate type) electro-fusion welding joints

Insulation PLUS and PLUS+ foaming length Lw=440mm			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits (bottled)	CATALOGUE No.
110	25	1	PURPw-110/25L440 PURP-110...
125	32	2	PURPw-125/32L440 PURP-125...
125	40	1	PURPw-125/40L440 PURP-125...
140	50	2	PURPw-140/50L440 PURP-140...
160	65	3	PURPw-160/65L440 PURP-160...
180	80	4	PURPw-180/80L440 PURP-180...
200	65	6	PURP+w-200/65L440 PURP+-200...
200	80	6	PURPw-200/80L440 PURP-200...
225	100	6	PURPw-225/100L440 PURP-225...
250	125	7	PURPw-250/125L440 PURP-250...
280	150	8	PURPw-280/150L440 PURP-280...
315	150	2x6	PURPw-315/150L440 PURP-315...
355	200	10	PURPw-355/200L440 PURP-355...
400	200	5+10	PURP+w-400/200L440 PURP+-400...
450	250	5+11	PURPw-450/250L440 PURP-450...
500	300	5+12	PURPw-500/300L440 PURP-500...
520	300	5+13	PURP+w-520/300L440 PURP+-520...
520	350	5+12	PURPw-520/350L440 PURP-520...
560	350	8+13	PURP+w-560/350L440 PURP+-560...
560	400	5+12	PURPw-560/400L440 PURP-560...
630	450	8+13	PURPw-630/450L440 PURP-630...
630	400	6+15	PURP+w-630/400L440 PURP+-630...
710	400	13+15	PURP+w-710/400L440 PURP+-710...
710	450	11+15	PURP+w-710/450L440 PURP+-710...
710	500	11	PURPw-710/500L440 PURP-710...
800	500	2x15	PURP+w-800/500L440 PURP+-800...
800	600	11+14	PURPw-800/600L440 PURP-800...
900	600	7+2x15	PURPw-900/900L440 PURP-900...

*Other diameters available on request

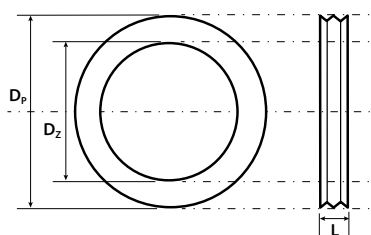
8.9.5 Proper selection of PUR to duo pipes – MTM heat shrinkable joints, MTX2 heat shrinkable radiation cross-linked joints

Insulation duo-pipe foaming length 320mm (free ends 160mm)			
JACKET PIPE external diameter Dz: [mm]	STEEL PIPE nominal diameter DN: [mm]	Foam-bags or foam-kits (bottled)	CATALOGUE No.
160	2 x 20	4	PURDw-160/2x020L320 PURD-160/2x020...
180	2 x 25	5	PURDw-180/2x025L320 PURD-180/2x025...
200	2 x 32	6	PURDw-200/2x032L320 PURD-200/2x032...
200	2 x 40	6	PURDw-200/2x040L320 PURD-200/2x040...
250	2 x 50	8	PURDw-250/2x050L320 PURD-250/2x050...
280	2 x 65	9	PURDw-280/2x065L320 PURD-280/2x065...
315	2 x 80	10	PURDw-315/2x080L320 PURD-315/2x080...
400	2 x 100	12	PURDw-400/2x100L320 PURD-400/2x100...
500	2 x 125	15	PURDw-500/2x125L320 PURD-500/2x100...
560	2 x 150	5+15	PURDw-560/2x150L320 PURD-560/2x150...
710	2 x 200	2x14	PURDw-710/2x200L320 PURD-710/2x200...

*Other diameters available on request

9. Goods and accessories.

9.1 PUG sealing rubber rings (wall bush).

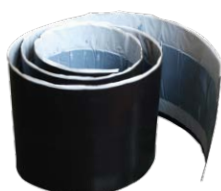


JACKET PIPE external diameter Dz: [mm]	PUG RING external diameter after placing on pre-insulated pipe Dp: [mm]	PUG ring length L: [mm]	CATALOGUE No.
90	126	50	PUG-090
110	146	50	PUG-110
125	161	50	PUG-125
140	176	50	PUG-140
160	196	50	PUG-160
180	216	50	PUG-180
200	236	50	PUG-200
225	261	50	PUG-225
250	286	50	PUG-250
280	316	50	PUG-280
315	351	50	PUG-315
355	391	50	PUG-355
400	436	50	PUG-400
450	486	50	PUG-450
500	536	50	PUG-500
520	556	50	PUG-520
560	596	50	PUG-560
630	666	50	PUG-630
710	746	50	PUG-710
800	836	50	PUG-800
900	936	50	PUG-900
1000	1036	50	PUG-1000

***Other PUG ring diameters available on request**

PUG sealing ring made of NR-SBR rubber mix, or – on customer demand – of synthetic EPDM rubber. It is used for sealing of the horizontal passes of pre-insulated pipe, through the building walls. It does not form a water-tight protection in case of high level ground water.

9.2 RJS-E heat-shrinkable, cross-linked premium class tape.



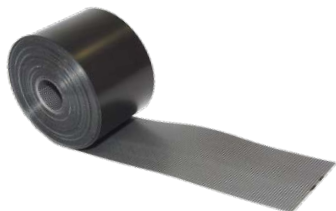
NAME	Tape width: [mm]	Tape length L: [m]	CATALOGUE No.
Heat shrinkable tape RJS-E	155	30	RJS-E155L300
		40	RJS-E155L400
	230	30	RJS-E230L300
		40	RJS-E230L400
	300	30	RJS-E300L300
	640	30	RJS-E640L300
	770	20	RJS-E770L300
	900	20	RJS-E900L200

Heat-shrinkable, premium class tape with hot-melt visco-elastic sealing. Highest resistance confirmed by tests at FFI Hannover, according to EN489:2009. The test sample lasted for over 100 cycles at sand-box test with sand's humidity of 0.5%.

Tape's surface is with the permanent change indicator (in form of the dimpled backing) disappearing in case of appropriate heating, making the assembly easier and improving the safety of installation.

9.3 WPCP-IV closure patch

PRODUCT NAME	Patch width: [mm]	Roll's length L: [m]	CATALOGUE No.
WPCP-IV closure patch	100	15	WPCP-IV100L150
	150	15	WPCP-IV150L150



Highest quality closure patches for heat shrink tapes (WPSM-PE, RJS-E). Guarantees secure tightening of tape ends during shrinking. Made of radiation cross-linked high density polyethylene, additionally reinforced with glass fiber. Available in rolls to be cut by user or in ready cut strips.

9.4 Butyl mastic M



PRODUCT NAME	Width [mm]	Length [mm]	No. of rolls in package	CATALOGUE No.
Mastic	30	30000	5	M-30L30000
Mastic	40	30000	4	M-40L30000
Mastic	50	30000	3	M-50L30000

Butyl mastic in rolls, delivered in boxes, as per table above.

9.5. FOPS patches protecting from infiltration of humidity



PRODUCT NAME	Diameter D: [mm]	CATALOGUE No.
FOPS patch	100	FOPS-100

Original patches for protection from infiltration of water/moisture into the joint, through the foaming openings. They last over 300 cycles in sand-box test at sand humidity below than 0.5% and over 1000 cycles with sand humidity below 8%.

Surface of FOPS patches are with permanent dotted green indicator (disappearing in case of appropriate heating) securing correct assembly and tight sealing.

9.6 HDPE100 wire for welding

ITEM	Material	Diameter [mm]	Colour	CATALOGUE No.
Welding wire PE 3	PE	3,0	black	DPE-300
Welding wire PE 4	PE	4,0	black	DPE-400



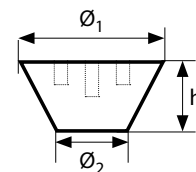
The HDPE welding wire is used as the binder for joining elements ie.: pipes, pipe sleeves, and joints made of HDPE100. The welding of plastic means permanent fusion of the thermoplastic materials using heat and pressure with or without additional binder. The same type of plastic could exclusively be welded. Therefore in case of polyethylene you can weld only these of same class (HDPE100), same molecular mass, same density and melt-flow index, that should guarantee good quality, mechanically withstanding connection.

9.7 HDPE plugs for heat-shrinkable and electro-fusion welding joints

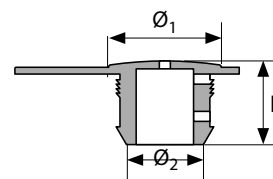
Plug are using to protect the joint set from infiltration of moisture through the foaming openings. There are 3 types of plugs:



1. weldable, closing (welded) **KW**:
material: HDPE 100
melt flow index MFR: 0,25 +/- 0,05 g/10min
measurements: $\varnothing_1=34,3\text{mm}$
 $\varnothing_2=19,0\text{mm}$
 $h=13,3\text{mm}$



2. ventilation (spiking) **KB**:
material: HDPE
measurements: $\varnothing_1=30\text{mm}$
 $\varnothing_2=19,0\text{mm}$
 $h=20,5\text{mm}$



3. two-parts expanding **KR**:
material: HDPE

9.8 Cutter for drilling the foaming openings



9.9 Holder for welding the plugs.



ITEM	CATALOGUE No.
Drilling cutter $\varnothing 24,5 \text{ mm}$	FDO-245/80

ITEM	CATALOGUE No.
Plug's holder	UT-KWSN

9.10 Welder for welding the plugs.



ITEM	CATALOGUE No.
Welder for welding the plugs	ZDWK-2KW

9.11 ZPCD Pressure test set (large one).

A set for pressure tests of tightness of heat-shrinkable, welded and also steel connections, pursuant to the requirements of the PN-EN 489:2020-01 Standard. According to that requirements the tightness of all connections is to be tested.

Pressure test shall be performed prior to foaming of PUR, in case of heat-shrinkable and welding joints - after the tested joint is fully cooled down. It is recommended to perform the test at a temperature of ≤ 35°C. The fluids used for tests can't affect the jacket pipe, the joint and the environment.

SET CONTAINS:

- pump with end plug and manometer
- additional end plug with vent valve
- sprinkler
- bottle for fluid soap
- set of rubber plugs for heat-shrinkable and welded joints

***Please note:** The appearance of set and its components may differ slightly from that in the image.



9.12 An isopropanol alcohol for cleaning the surface of the jacket pipe.



ITEM	Container's capacity [dm³]	CATALOGUE No.
Isopropanol alcohol	1	IPA-1
Isopropanol alcohol	5	IPA-5

9.13 Dust-free cleaning tissues.



ITEM	CATALOGUE No.
Dust-free cleaning tissues	CHB-280

9.14 DM copper wire and DMC tin-coated copper wire, diameter 1,39mm.



ITEM	CATALOGUE No.
DM copper wire	DAM-139
DMC copper tin-coated wire	DAMC-139

Wire diameter 1.39mm (cross-section 1.5mm²) for alarm systems of pre-insulated pipes, in rolls of ca. 20kg each (1kg=74 meters of wire).

9.15 PDA bracket (support) for alarm wire.



PRODUCT NAME	Height [mm]	CATALOGUE No.
Support	15	PDA-15
Support	36	PDA-36

Supports are used for assembly of insulating of the joints at building-site, to support alarm wires in proper position during PUR foaming.

Supports are available in two different height versions.

9.16 Brandes set.



ITEM	CATALOGUE No.
Non-pass-through connector Brandes	ZDBN
Heat-shrinkable sleeve Brandes	TTDB

9.17 ZDA connector for 1,39mm alarm wire.



PRODUCT NAME	CATALOGUE No.
Non-pass-through, tin-coated connector	ZDAN-139
tin-coated pass-through connector	ZDAP-139

9.18 Tape for fixing the PDA brackets.



ITEM	CATALOGUE No.
Fixing tape to PDA brackets	TDP

Paper tape for fixing the PDA brackets, temperature resistant.

9.19 An alarm wire outlet.



ITEM	Diameter D [mm]	CATALOGUE No.
Alarm wire outlet	32/16/18	WDA 3216
	32/20/20	WDA 3220
	32/22/20	WDA 3222
	32/25/20	WDA 3225

The alarm wire outlet is made of HDPE100 material.

9.20 CEG1 electro-fusion welding unit for MEZ sliding (closed) shrinkable joints



CEG1 welding unit is compatible with EG40 heating elements. It secures work in automatic mode. The operator's activity is limited to the correct installation of the joint and selection the diameter of the heating element being installed in the device menu. The welding unit automatically selects parameters, makes the necessary corrections and carries out and supervises the entire process. The welding parameters data are saved in the internal memory of the unit, from which can be sent in the form of protocols (via USB adapter) to a Windows PC.

This unit is designed for single welds in the range of 225-710 mm and double welds (two at the same time) in the range of 125-355 mm.

*The welding unit is also available in an extended version of CEG1a (3K3P-1) with an extended range of single welds in the range of 250-1200 mm and double welds in the range of 125-560 mm.

9.21 CEG2 (2k8P-I) electro-fusion welding, universal unit to MEZ sliding and MEP open (plate type) joints



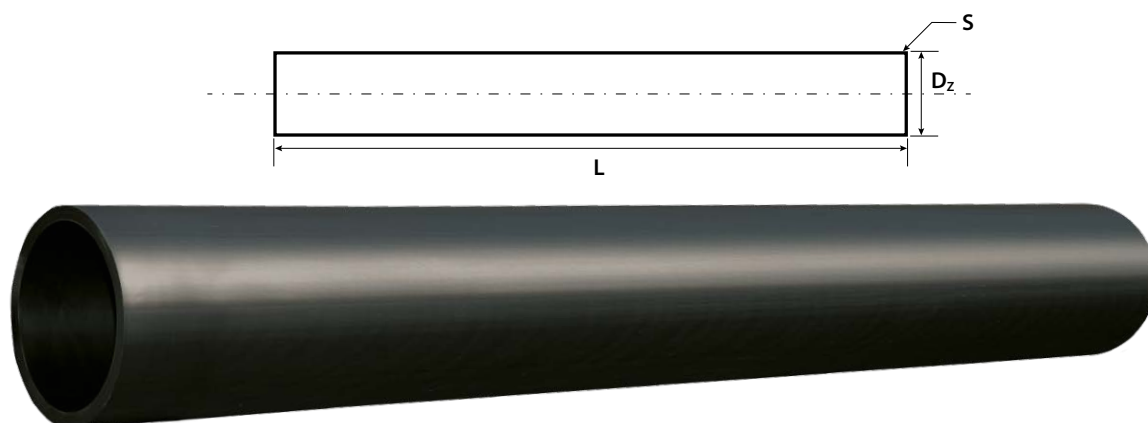
CEG2 universal welding unit enables welding of both open MEP joints and heat-shrinkable MEZ (compatible with EG40 heating elements). It enables full automation of the welding process and ensures control of welding parameters. Graphic LCD 5 inch display allows convenient monitoring of the operating parameters of the unit and supervision over the current temperature in the junction. Automatic control systems minimize the risk of damage to the joint during installation. The additional pre-heating phase allows the temperature to be equalized around the entire perimeter of the joint before the welding process starts and allows to improve the assembly of the joint in the event of improper adhesion to the jacket of the pre-insulated pipe before the main welding cycle. Automatic selection of one of the 12 algorithms of the unit allows for process optimization in fluent environmental conditions. The CEG2 unit guarantees the reliability and the highest security of protocols from the welding operations.

In case of MEZ joints the device is designed to perform single welds in the diameter range of 160-1200 mm and double welds in the range of 110-630 mm. For MEP joints, the device is designed for welding them in the diameter range of 110-1200 mm.

*CEG2 welding unit is also available in a simplified version CEG2a (2K8P) and is then dedicated only for welding MEP panel joints in the diameter range of 110-1200 mm.

10. Specialized pressure HDPE pipes.

10.1.1 HDPE100 CEGA pressure pipes PE-AS type, antistatic.



PE-AS pipe outer diameter Dz [mm]	SDR33 PN5 wall thickness s: [mm]	SDR26 PN6 wall thickness s: [mm]	SDR17 PN10 wall thickness s: [mm]	SDR11 PN16 wall thickness s: [mm]	SDR9 PN20 wall thickness s: [mm]	SDR7,4 PN25 wall thickness s: [mm]	SDR6 PN32 wall thickness s: [mm]	SDR5 PN40 wall thickness s: [mm]	CATALOGUE No.
75	2,3	2,9	4,5	6,8	8,4	10,3	12,5	15,1	RCA-33/.../..5/1C0075L0120
90	2,8	3,5	5,4	8,2	10,1	12,3	15,0	18,1	RCA-33/.../..5/1C0090L0120
110	3,4	4,2	6,6	10,0	12,3	15,1	18,3	22,1	RCA-33/.../..5/1C0110L0120
125	3,9	4,8	7,4	11,4	14,0	17,1	20,8	25,1	RCA-33/.../..5/1C0125L0120
140	4,3	5,4	8,3	12,7	15,7	19,2	23,3	28,1	RCA-33/.../..5/1C0140L0120
160	4,9	6,2	9,5	14,6	17,9	21,9	26,6	32,1	RCA-33/.../..5/1C0160L0120
180	5,5	6,9	10,7	16,4	20,1	24,6	29,9	36,1	RCA-33/.../..5/1C0180L0120
200	6,2	7,7	11,9	18,2	22,4	27,4	33,2	40,1	RCA-33/.../..5/1C0200L0120
225	6,9	8,6	13,4	20,5	25,2	30,8	37,4	45,1	RCA-33/.../..5/1C0225L0120
250	7,7	9,6	14,8	22,7	27,9	34,2	41,5	50,1	RCA-33/.../..5/1C0250L0120
280	8,6	10,7	16,6	25,4	31,3	38,3	46,5	56,2	RCA-33/.../..5/1C0280L0120
315	9,7	12,1	18,7	28,6	35,2	43,1	52,3	63,2	RCA-33/.../..5/1C0315L0120
355	10,9	13,6	21,1	32,2	39,7	48,5	59,0		RCA-33/.../..5/1C0355L0120
400	12,3	15,3	23,7	36,3	44,7	54,7			RCA-33/.../..5/1C0400L0120
450	13,8	17,2	26,7	40,9	50,3	61,5			RCA-33/.../..5/1C0450L0120
500	15,3	19,1	29,7	45,4	55,8				RCA-33/.../..5/1C0500L0120
560	17,2	21,4	33,2	50,8					RCA-33/.../..5/1C0560L0120

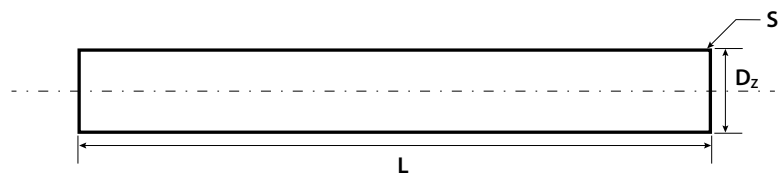
***Other thickness and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

PE-AS pipes are applied for pipe-line installations at the mining units, both onto the land as well as in the underground mine workings ie.: cuprum ore, silver, zink, lead, salt etc. They can also be used for other industrial applications.

PE-AS pipes are used for installation of different pipelines: technological, fire-fighting, air-condition, hydro-transport, drainage, etc.

10.1.2 HDPE100 CEGA pressure pipes PE-NP/AS type, flame retardant, antistatic.



PE-NP/AS pipe outer diameter Dz [mm]	SDR33 PN5 wall thickness s: [mm]	SDR26 PN6 wall thickness s: [mm]	SDR17 PN10 wall thickness s: [mm]	SDR11 PN16 wall thickness s: [mm]	SDR9 PN20 wall thickness s: [mm]	SDR7,4 PN25 wall thickness s: [mm]	SDR6 PN32 wall thickness s: [mm]	SDR5 PN40 wall thickness s: [mm]	CATALOGUE No.
75	2,3	2,9	4,5	6,8	8,4	10,3	12,5	15,1	RCAN-33/.../..5/1C0075L0120
90	2,8	3,5	5,4	8,2	10,1	12,3	15,0	18,1	RCAN-33/.../..5/1C0090L0120
110	3,4	4,2	6,6	10,0	12,3	15,1	18,3	22,1	RCAN-33/.../..5/1C0110L0120
125	3,9	4,8	7,4	11,4	14,0	17,1	20,8	25,1	RCAN-33/.../..5/1C0125L0120
140	4,3	5,4	8,3	12,7	15,7	19,2	23,3	28,1	RCAN-33/.../..5/1C0140L0120
160	4,9	6,2	9,5	14,6	17,9	21,9	26,6	32,1	RCAN-33/.../..5/1C0160L0120
180	5,5	6,9	10,7	16,4	20,1	24,6	29,9	36,1	RCAN-33/.../..5/1C0180L0120
200	6,2	7,7	11,9	18,2	22,4	27,4	33,2	40,1	RCAN-33/.../..5/1C0200L0120
225	6,9	8,6	13,4	20,5	25,2	30,8	37,4	45,1	RCAN-33/.../..5/1C0225L0120
250	7,7	9,6	14,8	22,7	27,9	34,2	41,5	50,1	RCAN-33/.../..5/1C0250L0120
280	8,6	10,7	16,6	25,4	31,3	38,3	46,5	56,2	RCAN-33/.../..5/1C0280L0120
315	9,7	12,1	18,7	28,6	35,2	43,1	52,3	63,2	RCAN-33/.../..5/1C0315L0120
355	10,9	13,6	21,1	32,2	39,7	48,5	59,0		RCAN-33/.../..5/1C0355L0120
400	12,3	15,3	23,7	36,3	44,7	54,7			RCAN-33/.../..5/1C0400L0120
450	13,8	17,2	26,7	40,9	50,3	61,5			RCAN-33/.../..5/1C0450L0120
500	15,3	19,1	29,7	45,4	55,8				RCAN-33/.../..5/1C0500L0120
560	17,2	21,4	33,2	50,8					RCAN-33/.../..5/1C0560L0120

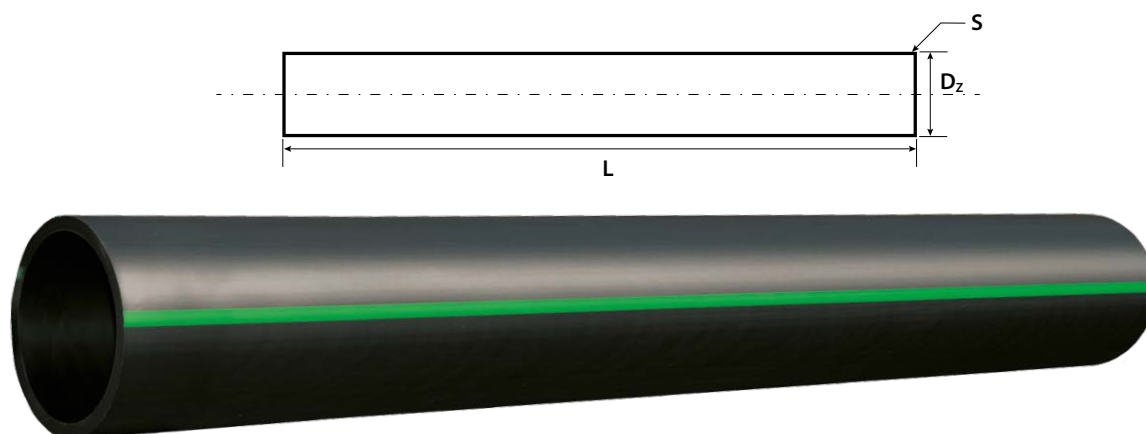
***Other thickness and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

PE-NP/AS multi-layer pipes are produced by co-extrusion (the layers are permanently interfused, and inseparable) to be used for installations at the mining units in chambers and the underground mine workings classified as „a“, „b“ and „c“ methane explosion risk as well as „A“ and „B“ coal-dust explosion risk.

PE-NP/AS pipes are used for installation of different pipelines: technological, fire-fighting, air-condition, hydro-transport, drainage, compressed air and neutral gases (inert gas), etc.

10.2.1 HDPE100 CEGA pressure pipes for sewerage, black, black with green longitudinal strips, or 2-layers HDPE100 RC with green external surface.



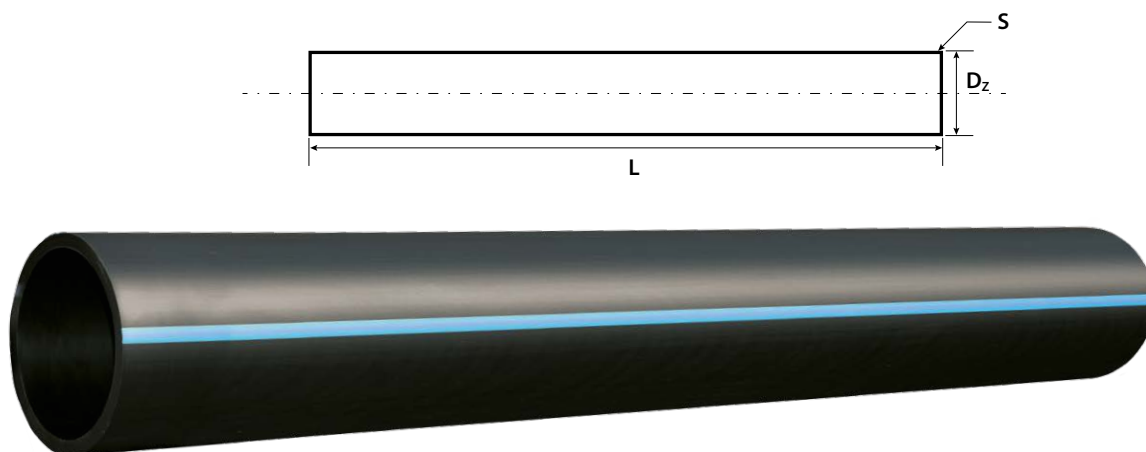
HDPE100 pipe outer diameter Dz [mm]	SDR26 PN6 wall thickness s: [mm]	SDR17 PN10 wall thickness s: [mm]	SDR11 PN16 wall thickness s: [mm]	Catalogue No Black pipe	CATALOGUE No. Black pipe with green longitudinal strips	CATALOGUE No. 2-layers pipe with green external surface
75	2,9	4,5	6,8	RCK-26/.../..11/1C075L12000	RCK-26/.../..11/1CZP075L12000	RCK-26/.../..11/2CZ075L12000
90	3,5	5,4	8,2	RCK-26/.../..11/1C090L12000	RCK-26/.../..11/1CZP090L12000	RCK-26/.../..11/2CZ090L12000
110	4,2	6,6	10,0	RCK-26/.../..11/1C110L12000	RCK-26/.../..11/1CZP110L12000	RCK-26/.../..11/2CZ110L12000
125	4,8	7,4	11,4	RCK-26/.../..11/1C125L12000	RCK-26/.../..11/1CZP125L12000	RCK-26/.../..11/2CZ125L12000
140	5,4	8,3	12,7	RCK-26/.../..11/1C140L12000	RCK-26/.../..11/1CZP140L12000	RCK-26/.../..11/2CZ140L12000
160	6,2	9,5	14,6	RCK-26/.../..11/1C160L12000	RCK-26/.../..11/1CZP160L12000	RCK-26/.../..11/2CZ160L12000
180	6,9	10,7	16,4	RCK-26/.../..11/1C180L12000	RCK-26/.../..11/1CZP180L12000	RCK-26/.../..11/2CZ180L12000
200	7,7	11,9	18,2	RCK-26/.../..11/1C200L12000	RCK-26/.../..11/1CZP200L12000	RCK-26/.../..11/2CZ200L12000
225	8,6	13,4	20,5	RCK-26/.../..11/1C225L12000	RCK-26/.../..11/1CZP225L12000	RCK-26/.../..11/2CZ225L12000
250	9,6	14,8	22,7	RCK-26/.../..11/1C250L12000	RCK-26/.../..11/1CZP250L12000	RCK-26/.../..11/2CZ250L12000
280	10,7	16,6	25,4	RCK-26/.../..11/1C280L12000	RCK-26/.../..11/1CZP280L12000	RCK-26/.../..11/2CZ280L12000
315	12,1	18,7	28,6	RCK-26/.../..11/1C315L12000	RCK-26/.../..11/1CZP315L12000	RCK-26/.../..11/2CZ315L12000
355	13,6	21,1	32,2	RCK-26/.../..11/1C355L12000	RCK-26/.../..11/1CZP355L12000	RCK-26/.../..11/2CZ355L12000
400	15,3	23,7	36,3	RCK-26/.../..11/1C400L12000	RCK-26/.../..11/1CZP400L12000	RCK-26/.../..11/2CZ400L12000
450	17,2	26,7	40,9	RCK-26/.../..11/1C0450L12000	RCK-26/.../..11/1CZP450L12000	RCK-26/.../..11/2CZ450LO120
500	19,1	29,7	45,4	RCK-26/.../..11/1C500L12000	RCK-26/.../..11/1CZP500L12000	RCK-26/.../..11/2CZ500L12000
560	21,4	33,2	50,8	RCK-26/.../..11/1C560L12000	RCK-26/.../..11/1CZP560L12000	RCK-26/.../..11/2CZ560L12000
630	24,1	37,4	57,2	RCK-26/.../..11/1C630L12000	RCK-26/.../..11/1CZP630L12000	RCK-26/.../..11/2CZ630L12000
710	27,2	42,1	64,5	RCK-26/.../..11/1C710L12000	RCK-26/.../..11/1CZP710L12000	RCK-26/.../..11/2CZ710L12000
800	30,6	47,4	72,6	RCK-26/.../..11/1C800L12000	RCK-26/.../..11/1CZP800L12000	RCK-26/.../..11/2CZ800L12000
900	34,4	53,3	81,7	RCK-26/.../..11/1C900L12000	RCK-26/.../..11/1CZP900L12000	RCK-26/.../..11/2CZ900L12000
1000	38,2	59,3	90,8	RCK-26/.../..11/1C1000L12000	RCK-26/.../..11/1CZP1000L12000	RCK-26/.../..11/2CZ1000L12000
1200	45,9	71,1	–	RCK-26/.../..11/1C1200L12000	RCK-26/.../..11/1CZP1200L12000	RCK-26/.../..11/2CZ1200L12000

***Other thickness and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

HDPE100 CEGA pressure pipes for sewerage are made of PE100 class material, and are in accordance with PN-EN 12201-2+A1:2013-12 Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). Part2: pipes.

10.2.2 HDPE100 CEGA pressure pipes for drinking water supply, black with blue longitudinal strips, or 2-layers HDPE100 RC with blue external surface.



HDPE100 pipe outer diameter Dz [mm]	SDR26 PN6 wall thickness s: [mm]	SDR17 PN10 wall thickness s: [mm]	SDR11 PN16 wall thickness s: [mm]	Catalogue No. Black pipe with blue longitudinal strips	Catalogue No. 2-layers pipe with blue external surface
75	2,9	4,5	6,8	RCw-26/.../..11/1CNP075L12000	RCw-26/.../..11/2CN075L12000
90	3,5	5,4	8,2	RCw-26/.../..11/1CNP090L12000	RCw-26/.../..11/2CN090L12000
110	4,2	6,6	10,0	RCw-26/.../..11/1CNP110L12000	RCw-26/.../..11/2CN110L12000
125	4,8	7,4	11,4	RCw-26/.../..11/1CNP125L12000	RCw-26/.../..11/2CN125L12000
140	5,4	8,3	12,7	RCw-26/.../..11/1CNP140L12000	RCw-26/.../..11/2CN140L12000
160	6,2	9,5	14,6	RCw-26/.../..11/1CNP160L12000	RCw-26/.../..11/2CN160L12000
180	6,9	10,7	16,4	RCw-26/.../..11/1CNP180L12000	RCw-26/.../..11/2CN180L12000
200	7,7	11,9	18,2	RCw-26/.../..11/1CNP200L12000	RCw-26/.../..11/2CN200L12000
225	8,6	13,4	20,5	RCw-26/.../..11/1CNP225L12000	RCw-26/.../..11/2CN225L12000
250	9,6	14,8	22,7	RCw-26/.../..11/1CNP250L12000	RCw-26/.../..11/2CN250L12000
280	10,7	16,6	25,4	RCw-26/.../..11/1CNP280L12000	RCw-26/.../..11/2CN280L12000
315	12,1	18,7	28,6	RCw-26/.../..11/1CNP315L12000	RCw-26/.../..11/2CN315L12000
355	13,6	21,1	32,2	RCw-26/.../..11/1CNP355L12000	RCw-26/.../..11/2CN355L12000
400	15,3	23,7	36,3	RCw-26/.../..11/1CNP400L12000	RCw-26/.../..11/2CN400L12000
450	17,2	26,7	40,9	RCw-26/.../..11/1CNP450L12000	RCw-26/.../..11/2CN450L12000
500	19,1	29,7	45,4	RCw-26/.../..11/1CNP500L12000	RCw-26/.../..11/2CN500L12000
560	21,4	33,2	50,8	RCw-26/.../..11/1CNP560L12000	RCw-26/.../..11/2CN560L12000
630	24,1	37,4	57,2	RCw-26/.../..11/1CNP630L12000	RCw-26/.../..11/2CN630L12000
710	27,2	42,1	64,5	RCw-26/.../..11/1CNP710L12000	RCw-26/.../..11/2CN710L12000
800	30,6	47,4	72,6	RCw-26/.../..11/1CNP800L12000	RCw-26/.../..11/2CN800L12000
900	34,4	53,3	81,7	RCw-26/.../..11/1CNP900L12000	RCw-26/.../..11/2CN900L12000
1000	38,2	59,3	90,8	RCw-26/.../..11/1CNP1000L12000	RCw-26/.../..11/2CN1000L12000
1200	45,9	71,1	–	RCw-26/.../..11/1CNP1200L12000	RCw-26/.../..11/2CN1200L12000

***Other thickness and diameters available on request**

****Supplementary to this system we offer fittings (elbows, T-pieces) made of material with the same technical properties**

HDPE100 CEGA pressure pipes for drinking water supply are made of PE100 class material, and are in accordance with PN-EN 12201-2+A1:2013-12 Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). Part2: pipes.



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