

**PUŽNI TRANSPORTERI**

**WORM CONVEYORS**



**Demos** d.o.o.

Tvornica za projektiranje, proizvodnju, montažu i servisiranje,  
opreme za zaštitu okoliša

## OPĆENITO

VEMOS pužni transporteri predviđeni su za vodoravni transport raznih praškastih, rastresitih, komadastih i sličnih materijala, ali po potrebi mogu se koristiti i u kosom, pa čak i u okomitom položaju. Uglavno se primjenjuju za transport materijala na udaljenosti (npr. dodavanje, oduzimanje, dijeljenje, sakupljanje materijala), kao i za obradu materijala (npr. miješanje, vlaženje) u raznim granama industrije. Posebno široku primjenu nalaze u prehrambenoj industriji (npr. mlinovi, uljare, pivovare, šećerane i slično), u poljoprivredi, u kemijskoj i farmaceutskoj industriji, u industriji cementa, u rudarstvu i metalurgiji, u termoelektranama, u postrojenjima za zaštitu čovjekove okoline, itd. Zahvaljujući našem iskustvu i neprekidnom praćenju najnovijih dostignuća na području transportne opreme, VEMOS pužni transporteri stekli su visok ugled, pa su danas ugrađeni u brojnim postrojenjima širom Hrvatske, kao i u mnogim zemljama svijeta. VEMOS pužni transporteri objedinjavaju mnoge dobre konstrukcijske osobine s visokom kvalitetom izrade, što ih čini vrlo korisnim, modernim, pouzdanim, trajnim i ekonomičnim transportnim sredstvom. Od njihovih prednosti posebice valja istaknuti ove:

- čvrsta i jednostavna konstrukcija
  - racionalno iskorištavanje prostora
  - nizak trošak pogonske energije
  - besprijekoran i potpuno pouzdan rad
  - zajamčeno postizanje nazivnih kapaciteta
  - dug vijek trajanja
  - jednostavno održavanje uz gotovo zanemarive troškove
  - mogućnost transportiranja vrućih materijala (do 300°C)
  - potpuna zaštita od korozije primjenom odgovarajućih zaštitnih premaza
  - provedba svih sigurnosnih mjera u skladu s propisima o zaštiti na radu
- VEMOS pužne transportere isporučujemo s nazivnim kapacitetom od 2,4 do 120 m<sup>3</sup>/h

## NAČIN DJELOVANJA

Transport materijala obavlja se pomoću odgovarajuće konstruiranog transportnog puža, koji se okreće unutar zatvorenog transportnog korita. Smjer kretanja materijala određuje se smjerom vrtnje transportnog puža. Transportni kapacitet pužnog transportera ovisi, između ostalog, o stupnju ispunjenosti transportnog korita koji je zavisan od vrste transportiranog materijala.

## KONSTRUKCIJA

VEMOS pužni transporteri sastoje se od u cijelosti čeličnog transportnog korita s kružnim ili polukružnim presjekom, te transportnog puža i pogonskog sklopa. Transportno korito izrađeno je od čeličnog lima, a izvodi se u obliku cijevi kružnog presjeka ili u obliku polukružnog korita s ravnim poklopcem. Ulaz i izlaz materijala mogu se izvesti na bilo kojem mjestu duž transportnog korita. Ulaz materijala mora, po pravilu, biti snabdjeven bilo ručnim zasunom za doziranje ili rotirajućim čelijskim dozatorom, kako bi se omogućilo ravnomjerno dodavanje materijala te na taj način spriječilo začepljenje transportera. Ako za doziranje materijala na ulazu nema mogućnosti, začepljivanje transportera treba spriječiti odgovarajućim konstrukcijskim preinakama na ulaznom dijelu transportnog korita i puža. Ako pužni transporter treba biti pripojen na sabirni bunker u kojem postoji pretlak zraka (kao što je to slučaj kod pneumatskog transporta, otprašivanje itd.), tada je neophodno da se, bilo na ulazu ili na izlazu materijala, ugradi rotirajući čelijski dozator, kako bi se na taj način osiguralo normano uzlaženje, odnosno izlaženje materijala iz transportera.

Transportni puž sastoji se od ojevastog vratila na koje je svarivanjem ili pomoću rastavljivih spojnica pričvršćena odgovarajuća zavojnica. Ovisno o vrsti transportiranog materijala, transportni puževi mogu biti različitih izvedbi, tako na primjer:

- Puž s punom zavojnicom namijenjen je za transport suhih sitnozrnastih i praškastih materijala, kao što su pšenica, pijesak, brašno, cement, ugljena prašina i slično.
- Puž s trakastom zavojnicom namijenjen je za transport komadastih i ljepljivih materijala, kao što su ugljen, rudača, šljunak, zemlja i slično. Trakasta zavojnica pričvršćuje se na vratilo pomoću rastavljivih spojnica.
- Puž s lopatastom, ili segmentnom zavojnicom, namijenjen je za transport stišljivih i tjestavih materijala, kao što su glina, vlažan ugljen i slično. Transportne lopatice odnosno segmentni pričvršćeni su na vratilo puža po zavojitoj liniji.
- Puž s ozubljenom zavojnicom istovjetan je pužu s punom zavojnicom, jedino što mu je zavojnica po svom obodu ozubljena, što omogućuje bolji transport nekih vrsta materijala.

Vratilo transportnog puža izrađuje se od čeličnih cijevi dužina do 3 m. Kod većih transportera te se cijevi međusobno povezuju rastavljivim utičnim spojevima. Vratilo je uležišteno u dva glavna ležaja, koji su smješteni u konzolnim ležajnim stalcima na čeonim stranama transportera. Uporni ležaj nalazi se na strani pogona i izlaza materijala, tako da je vratilo puža opterećeno na vlak, što je povoljnije nego da je opterećeno na tlak. Kod pužnih transportera dužih od 6 m vratilo transportnog puža mora se poduprijeti još i međuležajima postavljenima na razmaku od po 3 m. Međuležaji se izrađuju od različitih kvalitetnih materijala, između ostalih i od sivog lijeva, što omogućava normalan rad puža i na visokim temperaturama (do 300°C). Ti su međuležaji tako izvedeni da se po potrebi mogu lako zamijeniti, bez da je za to potrebno rastavljanje transportera.

Pogonski sklop pužnih transportera u standardnoj je izvedbi snabdjevena zupčanim redukcijским prigoonom, ali se na poseban zahtjev može izvesti i s lančanim ili remenskim prigoonom.

Pužne transportere izrađujemo, po pravilu, do najveće dužine od 30 m, kako bi se izbjeglo pretjerano torziono opterećenje vratila puža. Međutim, ako je zbog nemogućnosti ugradnje dvaju ili više uzastopnih puževa ipak potrebno primijeniti samo jedan pužni transporter dužine preko 30 m, tada takav transporter obavezno mora imati pogon na oba kraja puža.

## GENERAL

VEMOS worm conveyors are intended for horizontal conveyance or various powdered, loose, lumpy, pasty and similar materials. If required, they can also be applied in inclined and even in vertical position. They are mainly used for short-distance materials handling (e.g. charging, discharging, branching, gathering) as well as for materials treatment (e.g. mixing, wetting) in various branches of industry. Those conveyors have a particularly wide application food industry (e.g. flourmills, oil mills, breweries, sugar mills, and similar), agriculture, chemical and pharmaceutical industries, cement mills, mining and metallurgy, thermal power stations, sewage sedimentation plants and so on. Thanks to our rich experience and continuous following of the latest achievements in the field of conveying equipment, VEMOS worm conveyors have gained high reputation and presently they are installed in numerous plants all over Croatia, as well as in many countries abroad.

VEMOS worm conveyors combined many good design features with high-quality workmanship, what makes them very usable, modern, reliable, durable, and profitable. The following advantages should be pointed out:

- solid and simple steel structure
- economic space utilization
- low drive power consumption
- faultless and absolutely reliable operation
- guaranteed obtaining of nominal capacity
- long service life
- simple maintenance at almost negligible cost
- possibility of hot material conveyance (up to 300°C)
- perfect corrosion protection by means of appropriate protective coatings
- all safety equipment according to labour safety regulations

VEMOS worm conveyors are supplied with nominal outputs ranging from 2.4 up to 120 m<sup>3</sup>/h.

## FUNCTION

The material conveyance is performed by means of appropriately designed conveying worm, which rotates inside closed conveying duct. Direction of material movement is determined by the worm rotation sense. Worm conveyor output depends, among other things upon a degree of duct fullness, which depends on the type of material to be conveyed.

## DESIGN

VEMOS worms conveyors consist of all-steel circular-section or semicircular-section conveying duct, conveyor worm and drive assembly.

Conveying duct is made of steel plate and is designed as circular-section tube or semicircular-section trough with flat cover. Material inlet and outlet can be located in any point all along the conveying duct. As a rule, the material inlet is to be provided either with manually controlled gate or with automatic overshot rotary feeder enabling the adjustment of uniform material feeding and thus preventing the conveyor stopping. If there is no possibility to control the material feeding, the conveyor stopping shall be prevented by appropriate modifications of inlet section of conveying duct and worm. If worm conveyor is to be connected to a storage bin being under positive air pressure (as in case of pneumatic conveying, dust exhausting and similar), it is essential to provide the worm conveyor with the overshot rotary feeder to ensure normal inflow and outflow of material from the conveyor.

Conveyor worm consists of a tubular shaft with welded or detachable jointed worm spiral. Standard-type worm is right-handed, but if required, it can be left-handed or combined. Depending on the type of material to be conveyed, the design of conveying worms may be various, such as:

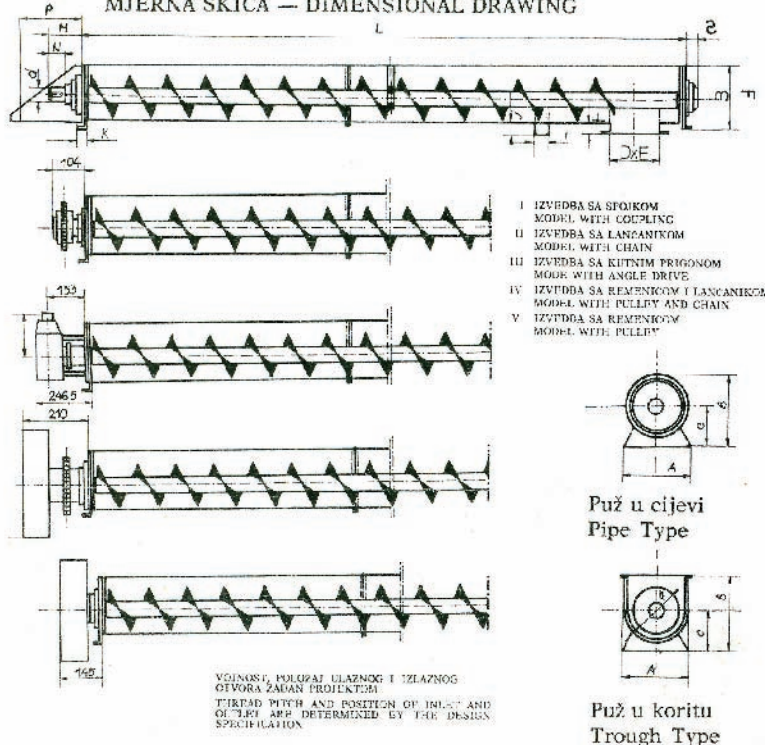
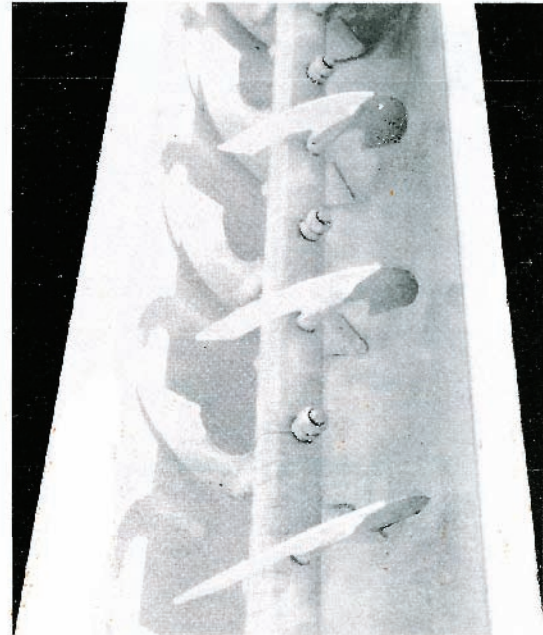
- Full-spiral worm is intended for conveyance of fine-grained or powdered materials, like cereals, sand, flour, cement, pulverized coal, etc.
- Tape-spiral worm is intended for conveyance of lumpy and sticky materials like coal, ore, gravel, earth, etc. The tape spiral is attached to worm shaft by means of detachable joints.
- Paddled-spiral and segmented-spiral worms are intended for conveyance of compressible and pasty materials, like clay, green coal, etc. Conveying paddles and segments are attached to worm shaft following a spiral line.
- Toothed-spiral worms is identical to full-spiral worm, but for the toothed spiral periphery, thus enabling more efficient conveyance of some materials.

Conveyor worm shaft is made of steel pipes up to 3 m long. For large conveyors these pipes are interconnected by means of detachable plugs-in joints. Worm shaft is running in two main bearings supported by brackets located on the conveyor front ends. The trust bearing is placed on the conveyor drive end (i.e. material outlet end), so that the worm shaft is subjected to tension, which is more favourable than if it would be subjected to compression. For worm conveyors longer than 6 m, the worm shaft must be supported by intermediate bearings at 3 m intervals. The intermediate bearings are made of various high quality materials; among others, they can be made of grey cast iron, thus enabling normal operation of worm at high temperatures (up to 300°C). The intermediate bearings are designed for easy replacement, not requiring disassembling of the conveyor.

Drive assembly of worm conveyors is standard-type, provided with direct-connected step-down gear unit; at request, it can be also provided with chain or belt transmission. As a rule, worm conveyors are manufactured with maximum length up to 30 m to prevent excessive tensional strain of worm shaft. However, when material conveyance on distances over 30 m is to be performed by means of single-unit conveyors (since there is no possibility to perform it with two or more conveyors units) such conveyors must obligatorily be drive on both worm ends.

**PUŽNI TRANSPORTERI JEDNODIJELNI**

MJERNA SKICA — DIMENSIONAL DRAWING


**1-SECTION WORM CONVEYOR**

**IZVEDBA PUŽA SA SEGMENTNOM ZAVOJNICOM  
CONSTRUCTION OF SEGMENTED-SPIRAL WORM**

MODEL		MJERE - DIMENSIONS														
TIP	Ø	d	A	B	C	D	E	F	L	S	I	J	K	M	N	P
120	120	30	204	195	110	174	144	68		22	80	38	40	100	60	420
150	150	30	234	225	125	204	174	68		22	80	38	40	100	60	420
180	180	30	264	255	140	244	204	68		22	80	38	40	100	60	420
210	210	30	294	285	155	284	234	68		22	80	38	40	100	60	420
250	250	30	336	335	175	326	276	37		52	80	42	40	135	60	420
300	300	50	406	390	210	386	326	42		57	100	42	40	145	80	480
360	360	50	466	450	240	466	386	42		57	100	42	50	145	80	480
400	400	50	506	485	255	506	426	42		57	100	42	50	145	80	480
500	500	60	521	605	320	621	531	42		57	100	42	50	145	80	480
630	630	60	756	748	388	776	666	42		57	100	42	50	145	80	480

Prema narudžbi  
Determined by the design specification

**MOGUĆNOST IZBORA**

Kao što se vidi iz priloženih tablica i mjernih skica, VEMOS pužne transportere isporučujemo u velikom izboru standardnih tipova, što pruža široke mogućnosti da se odabere onaj najprikladniji. Pored toga, na poseban zahtjev možemo isporučiti i pužne transportere izvan standardnog asortimana.

**UPUTA ZA NARUČIVANJE**

U narudžbi trebaju biti navedeni ovi podaci: tip transportera, željeni satni kapacitet, vrsta transportiranog materijala, ukupna transportirana dužina, mjesta ulaza i izlaza materijala, izvedba transportera (jednodijelna ili višedijelna), tip prigona i željeni način doziranja na ulazu materijala.

**UPUTE ZA PRORAČUN PUŽASTIH TRANSPORTERA**

Proračunavanje potrebne snage

Potrebna snaga za pogon pužnog transportera ovisi o dužini transporta materijala (L), željenom transportnom kapacitetu (Q<sub>i</sub>), koeficijentu otpora materijala povlačenju (λ) i konstanti «1,17» kojom se uzima u obzir otpor međuležaja. Potrebna snaga izračunava se pomoću jednadžbe:

$$N = \frac{L \cdot Q_i \cdot \lambda}{367} \cdot 1,17 \quad (\text{kW})$$

**LATITUDE IN SELECTION**

As the enclosed tables and dimensioned sketches show, VEMOS worm conveyors are supplied in a variety of standard types, thus offering a wide possibility for the right choice. Besides, at customer's request, we are ready to supply the non-standard worm conveyors.

**ORDERING INSTRUCTION**

The order shall include the following data: type of conveyor, hourly output required, type of material to be conveyed, total length of conveyance, material inlet and outlet points, conveyor version (single-unit or multi-unit), type of transmission and material inflow control required.

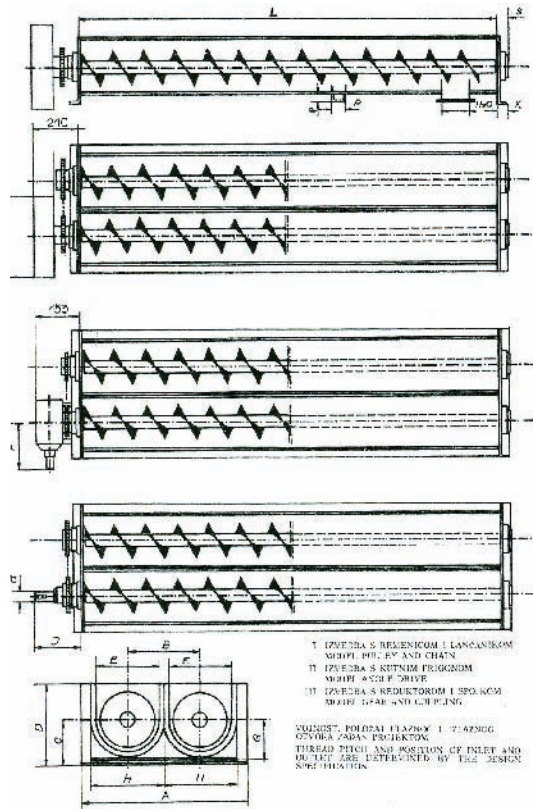
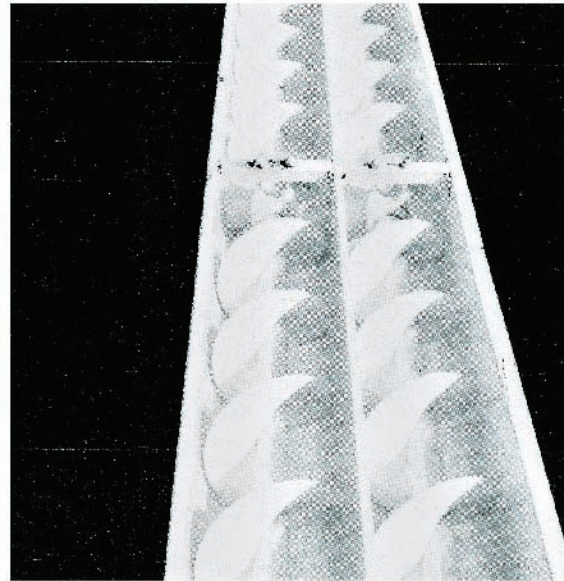
**WORM CONVEYOR CALCULATION INSTRUCTION**

Power consumption calculation

Worm conveyor power consumption depends upon conveyance length (L), required output (Q<sub>i</sub>), coefficient of material tractive resistance (λ), and constant «1,17», which takes into account the resistance of intermediate bearings.

Power consumption is to be calculated by means of equation:

$$N = \frac{L \cdot Q_i \cdot \lambda}{367} \cdot 1,17 \quad (\text{kW})$$

**PUŽNI TRANSPORTERI DVODIJELNI**

**2-SECTION WORM CONVEYOR**

**PUŽNI TRANSPORTER DVODIJELNI  
2 SECTION WORM CONVEYOR**

MODEL		MJERE - DIMENSIONS															
TIP	Ø	A	B	C	D	E	F	G	H	L	J	K	O	d	P	R	S
120	120	348	144	110	195	140	205	140	144	Prema narudžbi Determined by the design specification	170	40	174	30	80	38	22
150	150	408	174	125	225	170	205	155	174		170	40	204	30	80	38	22
180	180	468	204	140	255	200	220	170	204		170	40	244	30	80	38	22
210	210	528	234	155	285	230	240	185	234		170	40	284	30	80	38	22
250	250	612	276	175	335	270		175	276		170	40	326	30	80	42	52
300	300	832	326	210	390	320		205	326		167	40	386	50	100	42	57
360	360	852	386	240	450	380		235	386		167	50	466	50	100	42	57
400	400	932	426	255	485	420		250	426		167	50	506	50	100	42	57
500	500	1152	531	320	605	525		308	531		167	50	621	60	100	42	57
630	630	1422	666	388	748	660		375	666		167	50	776	60	100	42	57

**Oznake**

Kod proračunavanja transportnog kapaciteta i potrebne snage pužastih transportera koristimo se ovim oznakama:

- $Q_m$  = volumni kapacitet  $m^3/h$
- $Q_t$  = težinski kapacitet  $t/h$
- $N$  = potrebna snaga  $kW$
- $L$  = transportna dužina  $m$
- $D$  = promjer transportne spirale  $m$
- $d$  = promjer vratila puža  $m$
- $F$  = površina presjeka transportnog puža  $m^2$

$$\frac{D^2 \cdot \Pi}{4}$$

- $h$  = uspon spirale  $(0,8 - 1 D)$   $m$
- $f$  = stupanj punjenja transportnog korita  $(0,25 - 0,45)$  vidi tablicu 2
- $v$  = obodna brzina spirale  $(1 - 1,5 m/sek)$   $m/sek$
- $n$  = brzina vrtnje puža  $o/min$
- $\gamma$  = nasipna težina materijala  $t/m^3$
- $k$  = koeficijent sabijanja materijala ovisno o dužini transporta (vidi tablicu 1)
- $\lambda$  = koeficijent otpora materijala povlačenju (vidi tablicu 3)

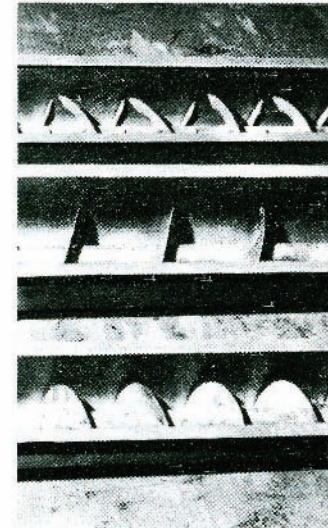
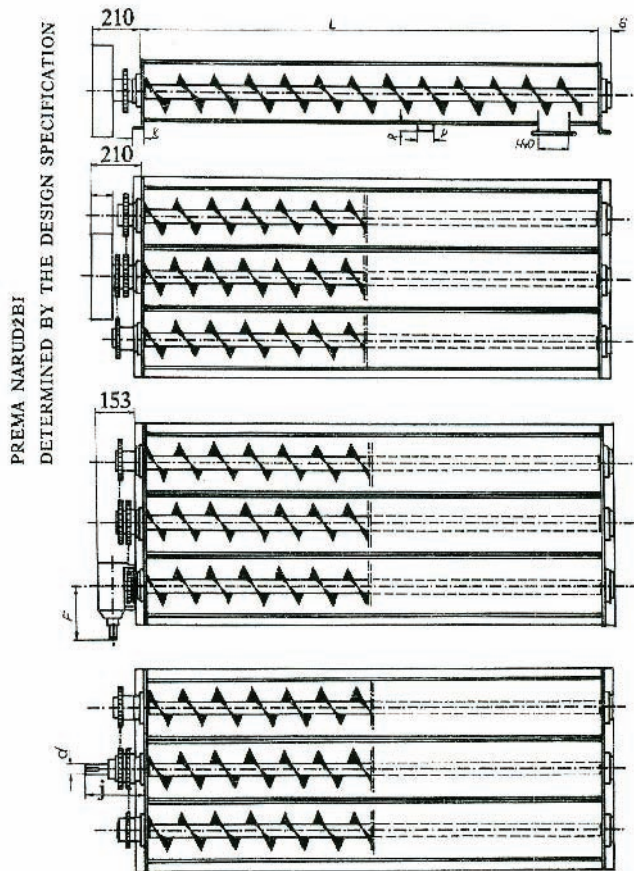
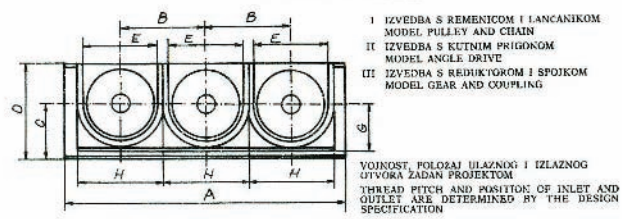
**Conventional signs**

The following conventional signs shall be used in calculating the worm conveyor output and power consumption:

- $Q_m$  = volume output  $m^3/h$
- $Q_t$  = weight output  $t/h$
- $N$  = required power  $kW$
- $L$  = conveyance length  $m$
- $D$  = conveyance spiral diameter  $m$
- $d$  = worm shaft diameter  $m$
- $F$  = worm cross-sectional area  $m^2$

$$\frac{D^2 \cdot \Pi}{4}$$

- $h$  = lead of spiral  $(0,8 - 1 D)$   $m$
- $f$  = degree of duct fullness  $(0,25 - 0,45)$  see table 2
- $v$  = worm peripheral speed  $(1 - 1,5 m/sek)$   $m/sek$
- $n$  = speed of rotation  $o/min$
- $\gamma$  = bulk density  $t/m^3$
- $k$  = bulk factor (see table 1)
- $\lambda$  = coefficient of material tractive resistance (see table 3)

**PUŽNI TRANSPORTERI TRODIJELNI 3-SECTION WORM CONVEYOR**

**RAZNE IZVEDBE PUŽEVA  
VARIOUS WORM TYPES**


MODEL		MJERE - DIMENSIONS															
TIP	Ø	d	A	B	C	D	E	F	G	H	L	J	K	O	P	R	S
120	120	30	492	144	110	195	140	205	140	144	Prema narudžbi Determined by the design specification	170	40	174	80	38	22
150	150	30	582	174	125	225	170	205	155	174		170	40	204	80	38	22
180	180	30	672	204	140	255	200	220	170	204		170	40	244	80	38	22
210	210	30	762	234	155	285	230	240	185	234		170	40	284	80	38	22
250	250	30	888	276	175	335	270		175	276		170	40	326	80	42	52
300	300	50	1058	326	210	390	320		205	326		167	40	386	100	42	57
360	360	50	1238	386	240	450	380		235	386		167	50	466	100	42	57
400	400	50	1358	426	255	485	420		250	426		167	50	506	100	42	57
500	500	60	1683	531	320	605	525		308	531		167	50	621	100	42	57
630	630	60	2088	666	388	748	660		375	666		167	50	776	100	42	57

**Proračunavanje kapaciteta**

Transportni kapacitet pužnog transportera ovisi o površini presjeka transportnog puža (F), stupnju ispunjenosti transportnog korita (f), usponu zavojnice transportnog puža (h), broju okretaja transportnog puža (n) i koeficijentu «k» kojim se uzima u obzir sabijanje materijala kao funkcija dužine transporta. Volumni kapacitet izračunava se pomoću jednadžbe:

$$Q_m = F \cdot f \cdot h \cdot n \cdot 60 \cdot k \quad (\text{m}^3/\text{h})$$

Težinski kapacitet izračunava se množenjem volumnog kapaciteta s nasipnom težinom materijala :

$$Q_t = Q_m \cdot \gamma \quad (\text{t/h})$$

Volumni kapacitet pužnih transportera opremljenih pužom s punom i ozubljenom zavojnicom kreće se u rasponu od 2,4 do 120 m<sup>3</sup>/h, dok je kod puževa s trakastom i segmentnom zavojnicom manji za 10 – 20%. Kapacitet transportera smanjuje se s povećanjem dužine transporta zbog slabijeg sabijanja materijala (smanjuje se koeficijent sabijanja «k»).

**Output calculation**

Worm conveyor output depends upon worm cross-sectional area (F), degree of duct fullness (f), lead of worm spiral (h), speed of worm rotation (n), and bulk factor (k) which takes into account the compatibility of conveyed material as a function of conveyance length.

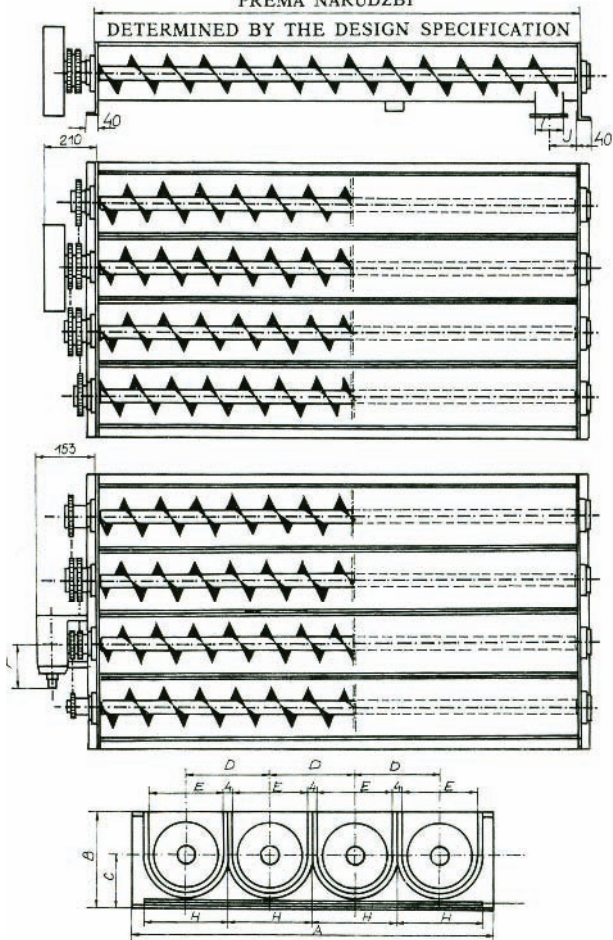
Volume output is to be calculated by means of equation:

$$Q_m = F \cdot f \cdot h \cdot n \cdot 60 \cdot k \quad (\text{m}^3/\text{h})$$

Weight output is to be calculated by multiplying the volume output value by bulk density of conveyed material:

$$Q_t = Q_m \cdot \gamma \quad (\text{t/h})$$

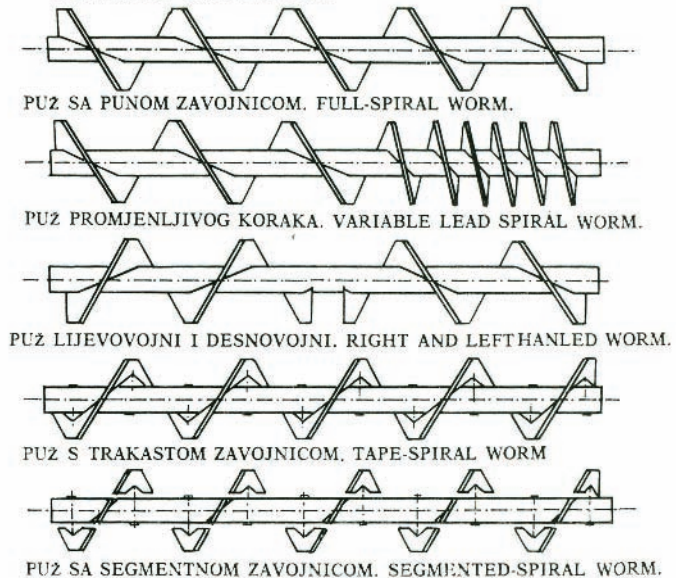
Volume output of worm conveyors with full-spiral and toothed-spiral worms ranges from 2.4 up to 120 m<sup>3</sup>/h. The volume output for conveyors with tape-spiral, paddled-spiral and segmented-spiral worms is 10 to 20% lower. The conveyor output decreases with length of conveyance because of lower material compaction (bulk factor «k» decreases).

**PUŽNI TRANSPORTERI ČETVERODIJELNI**
**4-SECTION WORM CONVEYOR**
**MJERNA SKICA — DIMENSIONAL DRAWING  
PREMA NARUDŽBI**


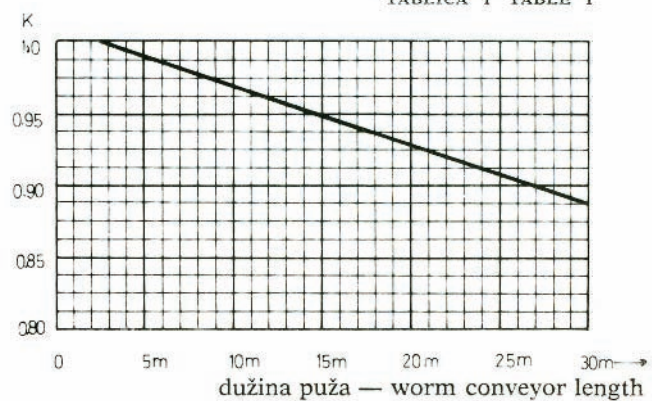
MJERE U mm DIMENSIONS IN mm

TIP TYPE	A	B	C	D	E	F	H
120	636	195	110	144	140	205	144
150	756	225	125	174	170	205	174

i-j PREMA NARUDŽBI — i-j DETERMINED BY THE DESIGN SPECIFICATION

**RAZNE IZVEDBE ZAVOJNICA  
DIFFERENT WORM MODELS**


TABLICA 1 TABLE 1


 FAKTOR — K — UPOTREBITI SAMO KOD BRASNASTIH MATERIJALA.  
FACTOR — K — IS TO BE USED ONLY POWDERED MATERIALS.

Kapacitet transportera smanjuje se i s povećanjem nagiba transportera: za svaki stupanj povećanja nagiba kapacitet se smanjuje za oko 2%. Nagib pužnog transportera do 15° smatra se još normalnim, premda mu transportni kapacitet u tom položaju iznosi svega oko 70% od kapaciteta u vodoravnom položaju, ali tada je veliko smanjenje transportnog kapaciteta zbog nagiba potrebnog kompenzirati povećanjem broja okretaja puža odnosno povećanjem stupnja ispunjenosti transportnog korita (do 75%).

**Opaska**

Transportni kapacitet pužnog transportera (Q) i snaga potrebna za njegov pogon (N) u funkcionalnoj su zavisnosti, a njihov međusobni odnos ovisi o stupnju ispunjenosti transportnog kanala (f) i vrsti transportiranog materijala, tj. o njegovoj nasipnoj težini ( $\gamma$ ). S istom instaliranom snagom ( $N = \text{konst}$ ) pužni transporter može imati isti transportni kapacitet (Q) za različite vrste transportiranog materijala ( $\gamma$ ), samo je potrebno mijenjati stupanj ispunjenosti transportnog kanala (f).

Ako je stupanj ispunjenosti transportnog kanala konstantan (na pr.  $f = 0,33$ ), međusobni odnos transportnog kapaciteta i potrebne snage ovisi o dužini transportnog kapaciteta i potrebne snage ovisi o dužini transporta (L), kako je to prikazano u tablici. Tablica A vrijedi za transportiranje materijala nasipne težine  $\gamma = 1,5$ , a Tablica B za one s nasipnom težinom  $\gamma = 1$ .

Vrijednosti navedene u tablicama mogu poslužiti za orijentacioni proračun. Za točan proračun treba se koristiti eksperimentalnim, odnosno iskustvenim podacima.

The output also decreases with the increase of conveyor inclination: inclination increases for one angular degree decreases the output for about 2%. Worm conveyor inclination on up to 15° is to be considered normal, although the output at this inclination is only about 70% of output in horizontal position. The worm conveyors can also be used at steep inclination and even in vertical position; however, in such case the high decrease of output shall be compensated by increasing of the worm r.p.m. and of the degree of duct fullness (up to 75%).

**Note**

The worm conveyor output (Q) and power consumption (N) are functionally interdependent and their relation depends upon the degree of duct fullness (f) and type of conveyed material, i.e. its bulk density ( $\gamma$ ).

It is possible to reach the same conveyor output for various conveyed materials with the same installed power ( $N = \text{konst}$ ), changing only the degree of duct fullness.

When degree of duct fullness is constant (e.g.  $f = 0.33$ ), the output-to-power consumption ration depends on conveyance length, as it is shown in Table. Table (A is valid for  $\gamma = 1.5$ ), and Table B for  $\gamma = 1$ .

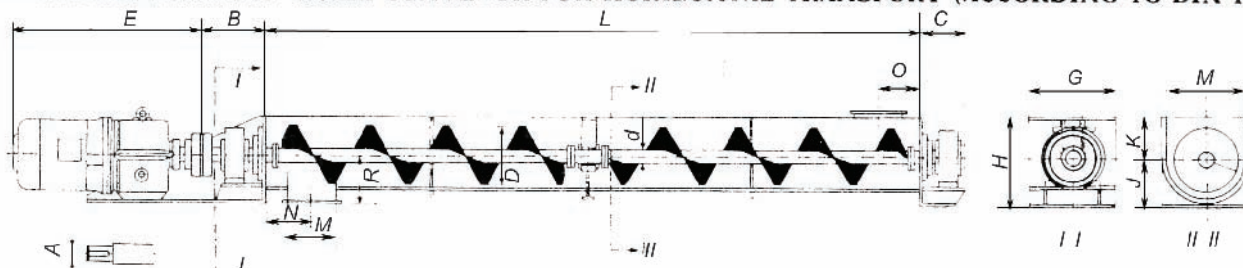
The values show in tables may be used for approximate calculation, the experimental or empirical data shall be used.

**MAKSIMALNO PUNJENJE KORITA (f) CONVEYING DUCT MAXIMUM FILLING (f)**

VRSTA TRANSPORTNOG MATERIJALA	Nasipna težina (t/m <sup>3</sup> )	Stupanj (postotak) ispunjenosti korita	Najviša dopuštena brzina vrtnje puža (O/min)
TYPE OF MATERIAL TO BE CONVEYED	Bulk density range (t/m <sup>3</sup> )	Degree (percentage) of duct fullness	Maximum permission worm rotation speed (R.P.M.)
cement, gips, cinkov oksid, mljeveni vapnenac, sumpor, lijevački pijesak, mljeveni boksit, glina, itd. <i>cement, gypsum, zinc oxide, limestone powder, sulphur, moulding sand, grinded bauxite clay, etc.</i>		0,25 – (25%)	70 – 50
vapnenac, azbest, boraks, komadni ugljen, itd. <i>limestone, asbestos, borax, lump coal, etc.</i>	0,6 – 1,2	0,30 – (30%)	95 – 60
grahorica, kava, orašasti ugljen, hidrirano vapno, itd. <i>vetch coffee-bean, nut coal, hydrated lime, etc.</i>		0,38 – (38%)	120 – 70
suho žito, brašno, ugljena prašina, itd. <i>dry cereals, flour, coal dust, etc.</i>		0,45 – (45%)	180

**KOEFICIJENT OTPORA MATERIJALA POVLAČENJA λ COEFFICIENT OF MATERIAL TRACTIVE RESISTANCE λ**

Vrsta materijala - Type of material	Koeficijent - Coefficient
Zob, ječam, pšenica, kukuruz, riža, brašno, cement, hidrirano vapno, sortirani ugljen, glina <i>Oats, barley, wheat, maize, rice, flour, cemen, hydrate lime, sized coal, clay</i>	1,85
Lignit, hematite, razne rudače, negašeno vapno, sirovi ugljen, lapor <i>Lignite, hematite ore, various ores, burnt lime, green coal, marl</i>	2,15
Pepeo, ugljena troska, šljunak, koks, pijesak, mort <i>Ashes, cinder, gravel, coke, mortar, sand</i>	3,00

**MJERNA SKICA TRANSPORTNI PUŽ ZA HORIZONTALNI TRANSPORT (PO DIN-u 15261)  
DIMENSIONAL DRAWING WORM CONVEYOR FOR HORIZONTAL TRANSPORT (ACCORDING TO DIN 15261)**


PUŽNICA SPIRAL-WORM	MJERE U (mm) - DIMENSIONS IN MILLIMETERS												
ØD/d	A	B	C	E*	G	H	J	K	L	M	N	O	P
160/44,5	Ø28	285	200		266	270	150	125		180	180	150	135
200/51	Ø32	295	201	466	306	322	180	147		220	200	160	160
250/63	Ø38	335	203	671	356	380	210	175		270	250	190	190
315/76	Ø45	360	220	671	441	460	250	215		336	300	220	230
400/89	Ø55	420	260	711	533	554	300	259		424	350	270	280
500/89	Ø60	420	237	711	653	685	375	315		524	400	320	340
630/133	Ø80	450	262		790	838	450	393		660	500	400	420
800/159	Ø90	535	285		970	1043	560	488		830	600	500	520

\* OVISNO O TIPU REDUKTORA – DEPENDING ON TYPE OF REDUCER

**UČIN I POTREBNA SNAGA KOD  $f = 0,33$   
CAPACITY AND NECESSARY POWER AT  $f = 0,33$** 

TABLICA A - TABLE A

A ( $\gamma=15$ )	Promjer pužnice Worm diameter DØ	n o/min. R.P.M.	Uspon Lead		Potrebna snaga u (kW) kod dužine puža u (m)					Necessary power (kW) at worm length (m)		
			h	F	Q <sub>m</sub>	Q <sub>t</sub>	5	10	15	20	25	30
			mm	m <sup>2</sup>	m <sup>2</sup> /h	t/h						
	160	90	160	0,020	5,7	8,5	0,25	0,5	0,75	1	1,25	1,5
	200	80	200	0,031	10	15	0,44	0,88	1,34	1,77	2,2	2,64
	250	80	250	0,049	19	29	0,85	1,72	2,56	3,5	4,26	5,14
	315	63	300	0,077	29	43	1,26	2,52	3,80	5,05	6,35	7,6
	400	50	355	0,125	44	66	1,94	3,88	5,84	7,8	9,73	11,74
	500	40	400	0,196	62	93	2,75	5,48	8,25	11,0	13,75	16,5
	630	40	450	0,311	110	165	4,85	9,7	14,6	19,5	22,4	29,3
	800	32	500	0,502	160	240	7,1	14,2	21,2	28,3	35,4	42,5

TABLICA B - TABLE B

B ( $\gamma=1$ )	160	90	160	0,020	5,7	5,7	Potrebna snaga u (kW)			Necessary power (kW)		
							0,16	0,33	0,50	0,67	0,84	1
							0,29	0,59	0,88	1,17	1,48	1,77
	200	80	200	0,031	10	10	0,56	1,12	1,68	2,24	2,80	3,36
	250	80	250	0,049	19	19	0,85	1,72	2,56	3,42	4,28	5,13
	315	63	300	0,077	29	29	1,30	2,58	3,90	5,19	6,46	7,80
	400	50	355	0,125	44	44	1,83	3,66	5,48	7,31	9,10	10,94
	500	40	400	0,196	62	62	3,24	6,48	9,75	12,95	16,4	19,4
	630	40	450	0,311	110	110	4,7	9,4	14,1	18,9	23,6	28,4

**PRIDRŽAVAMO PRAVO IZMJENE TABELARNIH PODATAKA – THE RIGHT OF CHANGING THE TABLE DATA IS RESERVED**


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