

PRIJE UPORABE
trebate pažljivo pročitati i razumjeti upute za
uporabu

PNEUMATSKI ČEPOVI

UPUTE ZA SIGURNO KORIŠTENJE

Nepoštivanje uputa i sigurnosnih mjera pri radu s pneumatskim čepovima može dovesti do TEŠKIH OZLJEDA ili čak SMRTI.

DVANAEST PRAVILA ZA SIGURAN RAD SA PNEUMATSKIM ČEPOVIMA

1. Nemojte stajati u blizini čepa kada je pod pritiskom (11)
2. Uvijek koristite zaštitnu odjeću i opremu (5)
3. Uvijek koristite precizno kalibrirane instrumente (3)
4. Nikada ne prelazite maksimalni tlak punjenja (8)
5. Nikada ne prelazite preporučenu maksimalnu vrijednost protutlaka (9)
6. Uvijek koristite sigurnosnu podršku (potporu) u slučaju protutlaka da zaštitite čep (10)
7. Uvijek ispuštite pritisak iz segmenta (protutlak), a zatim ispuštite pneumatski čep (12)
8. Prije i nakon svake uporabe, očistite čep i provjerite da njegova površina nije oštećena, zarezana ili da nema nekih drugih vrsta oštećenja (2)
9. Uvijek odaberite pravu veličinu pneumatskog čepa (4)
10. Prije umetanja pneumatskog čepa, temeljito očistite cijev (6)
11. Uvijek ispravno umetnite pneumatski čep u cijev (7)
12. Uvijek utvrditi iznos protutlaka pneumatskog čepa koji mora izdržati tijekom uporabe (1)

ŠEST KORAKA ZA UPOTREBU PNEUMATSKIH ČEPOVA POVEZANIH SA DVANAEST PRAVILA ZA SIGURAN RAD

KAKO IZABRATI PRAVI PNEUMATSKI ČEP?

1. Uvijek odredite protutlak koji pneumatski čep mora izdržati pri upotrebi.
2. Uvijek izaberite pravu veličinu čepa na način da prije izmjerite unutrašnji promjer cijevi.

KAKO PRIPREMITI PNEUMATSKI ČEP ZA CIJEV?

1. Prije svake upotrebe čep očistite i pregledajte da na površini nema razderotina, zareza ili nekakvih drugih oštećenja.
2. Uvijek provjerite priključke na čepu da ne puštaju.
3. Prije umetanja čepa u cijev uvijek ukloniti prljavštinu i blato iz cijevi (sve nečistoće).

UPOTREBA SIGURNOSNIH NAPRAVA

1. Uvijek upotrebljavajte zaštitnu odjeću, obuću i opremu.
2. Uvijek upotrebljavajte sigurnosne potpore za čep.
3. Upotrebljavajte samo pravilno kalibrirane (umjerene) manometre.

PRAVILNO UMETANJE ČEPA U CIJEV

1. Provjerite je li čep potpuno umetnut u cijev, tako da nijedan dio ne strši iz cijevi kada je čep napuhan.
2. Prvo, ispunite (napuhajte čep) tako da dodiruje stijenku cijevi. Zatim polako i oprezno povećavajte pritisak do najvećeg dozvoljenog radnog tlaka.

PRAVILNA UPOTREBA ČEPA UNUTAR CIJEVI

1. Ne zadržavajte se u blizini čepa kada je napuhan.
2. Nikada nemojte prekoračiti najveći dozvoljeni tlak punjenja čepa (radni tlak čepa).
3. Nikada nemojte prekoračiti najveći dopušteni protutlak.

ISPRAVNO ODSTRANJIVANJE ČEPA IZ CIJEVI

1. Uvijek prvo ispuštite protutlak, a zatim ispuštite zrak iz čepa.

UPUTE ZA UPOTREBU ČEPOVA

Pri upotrebi čepova potrebno je poštivati kombinaciju: izvor zraka - tlačni regulator - kontrolni manometar - dovodna cijev za zrak - čep, s čime sprečavamo da bi pri punjenju čepa prekoračili dozvoljeni tlak. Nikada se ne smije zaobići korištenje kontrolnog manometra (tlačnog regulatora) pri punjenju čepa. Kontrolni manometar je opremljen sigurnosnim ventilom koji je kalibriran u odgovarajućem rasponu tlaka (svakako je potrebno obratiti pozornost na tlak za koji je dizajniran kontrolni manometar).

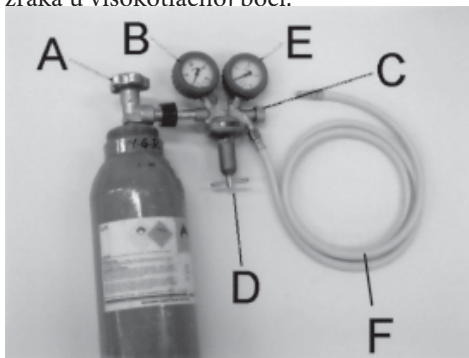
Prije upotrebe čepa potrebno je kontrolnim manometrom podesiti tlak. Vrijednost tlaka ne smije prelaziti vrijednost koja je određena kao maksimalni ulazni tlak. Čep preko cijevi povežemo sa kontrolnim manometrom, koji je povezan sa izvorom zraka te ga pravilno stavimo u cijev, podupremo ga i maknemo se iz opasne zone. U trenutku kada smo ispoštovali sve sigurnosne uvjete otvaramo ventil za punjenje čepa. Prilikom punjenja čepa kontroliramo radni tlak na manometru. Kada se približimo maksimalnoj dozvoljenoj vrijednosti prestajemo s punjenjem. U slučaju duljeg korištenja moguć je pad tlaka u čepu, zbog čega je potrebno stalno kontrolirati tlak. Ako dođe do pada tlaka potrebno ga je korigirati. Ako komprimirani zrak sadrži ulje, upotrijebite uljni separator.

Dovod zraka

Za punjenje čepova može se upotrijebiti svaki izvor zraka koji ne prelazi maksimalni ulazni tlak na manometru. Ukoliko je ulazni tlak viši od dozvoljenog potrebno je upotrijebiti tlačni regulator.

Upotreba visokotlačne boce s komprimiranim zrakom pod tlakom 200 ili 300 bara

Regulator tlaka preko nastavka s navojem priključite na visokotlačnu bocu s komprimiranim zrakom. Zatvorite izlaz zraka na regulatoru tlaka, tako da zategnete vijak za podešavanje (C). Otvorite ventil visokotlačne boce(A); manometar (B) pokazuje tlak zraka u visokotlačnoj boci.

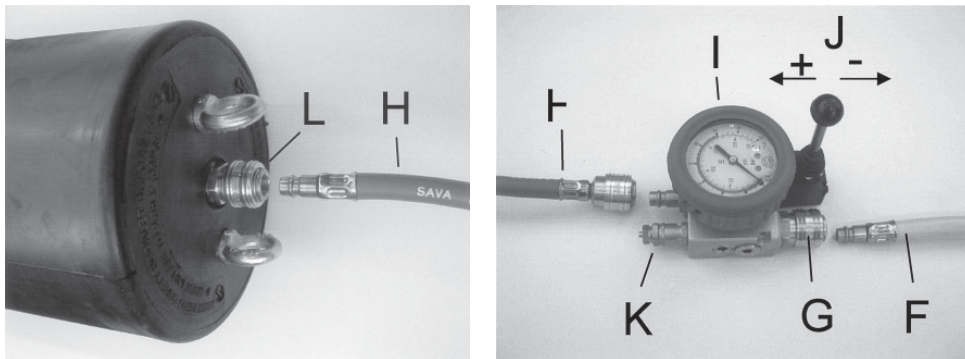


Pomoću ventila za podešavanje (D) postavite izlazni tlak na željenu vrijednost. Iznos postavljenog tlaka prikazan je na manometru(E); zatim ponovno otvorite vijak za podešavanje (C).

Punjenje čepa sa regulatorom,

Važno je da cijev za zrak na regulatoru tlaka, (F) bude spojena sa regulatorom(G). Spojite ih na način, da muški nastavak stavite u ženski i pritisnete ga na mjesto.

Regulator preko cijevi za zrak (H) povežite s čepom (L). Utikač na ulaznoj cijevi stavlja se u utikač na čepu, prilikom čega se upotrebljava potisna sila dok sve sjedne na mjesto.



Ako upotrebljavate druge izvore komprimiranog zraka, obavezno postavite ulazni tlak na određenu vrijednost, koja ne smije prijeći vrijednost maksimalnog dozvoljenog tlaka.

Čep napunite tako da pritisnete ručicu (J) kako biste procijenili vrijednost. Stvarnu provjeru pratite na manometru (I), koji pokazuje vrijednost tlaka u čepu.

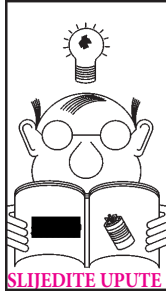
Kada se postigne radni tlak, punjenje se prekida, tako da se poluga spusti. Poluga se automatski vraća u neutralni položaj (položaj sa sigurnosnom bravom).

Ako tlak u čepu prelazi maksimalni tlak punjenja, označen na regulatoru, potrebno ga je automatski otpustiti pomoću sigurnosnog ventila (K).

Kada želite isprazniti čep, ili smanjiti tlak, upotrijebite ručicu (J), koju pomaknete u smjeru suprotnom od manometra.

Upotreba drugih izvora komprimiranog zraka

Za druge izvore komprimiranog zraka (industrijska postrojenja, kompresori, ...) potrebno je koristiti razne adaptere. Ako maksimalni tlak komprimiranog zraka premašuje maksimalni ulazni tlak, koji je označen na regulatoru, koristite regulator tlaka i smanjite pritisak na određenu vrijednost.



Upute za siguran rad sa pneumatskim čepovima.

UPOZORENJE!

PRIJE UPOTREBE PNEUMATSKIH ČEPOVA POZORNO PROČITAJTE UPUTE!

UPUTE VRIJEDE ZA SVE VELIČINE I VRSTE PNEUMATSKIH ČEPOVA.

UPUTE MORAJU BITI DOSTUPNE SVIMA KOJI KORISTE PNEUMATSKE ČEPOVE.

Preporuke, zahtjevi i upute za korištenje pneumatskih čepova primjenjuju se na sve veličine i vrste pneumatskih čepova.

Upute za projektiranje, proizvodnju i kontrolu proizvoda uvijek uzimaju u obzir visoku razinu sigurnosti, koja je obvezujuća, ne samo za proizvođača, već i za korisnika. Korisnik i proizvođač moraju kada koriste pneumatske čepove uvijek slijediti upute za sigurnu i pravilnu upotrebu.

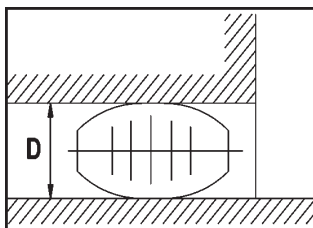
Pažljivo pročitajte upute. Ako imate bilo kakvih pitanja ili u slučaju posebnih okolnosti, koje nisu opisane u ovom priručniku, obratite se nadzoru ili osobi zaduženoj za sigurnost na gradilištu.

1. Uvijek odredite protutlak, koji pneumatski čep za vrijeme upotrebe mora izdržati

UPOZORENJE!

PRILIKOM UPOTREBE PNEUMATSKOG ČEPA: KADA SE UMETNE U CIJEV I NAPUNI ZRAKOM - U ČEPU NASTAJE VELIKA SILA. UKUPNA SILA, KOJA DJELUJE NA ČEP JE PROPORCIONALNA TLAKU KAO I POVRŠINA OTVORA CIJEVI.

VISINE PROTUTLAKA NA PNEUMATSKI ČEP NAVEDENE SU NA KRAJU OVOG PRIRUČNIKA.

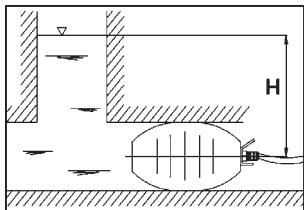


1. Izmjerite unutarnji promjer D (mm) cijevi, koja će biti zabrtvljena sa pneumatskim čepom
2. Izračunajte površinu S (mm²) presjeka cijevi po jednadžbi:

$$S = \pi \cdot \frac{D^2}{4} \text{ (mm}^2\text{)}$$

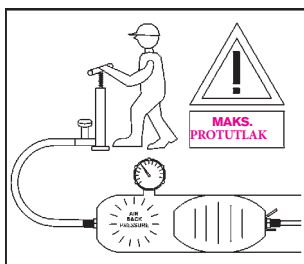
gdje je $\pi = 3,1416$

D – unutarnji promjer (mm) (in)



3. Izračunajte ukupnu silu, koju čep mora zadržati, po sljedećoj formuli:

$$F = p_z \cdot S \cdot 0,1 \text{ (N)}$$

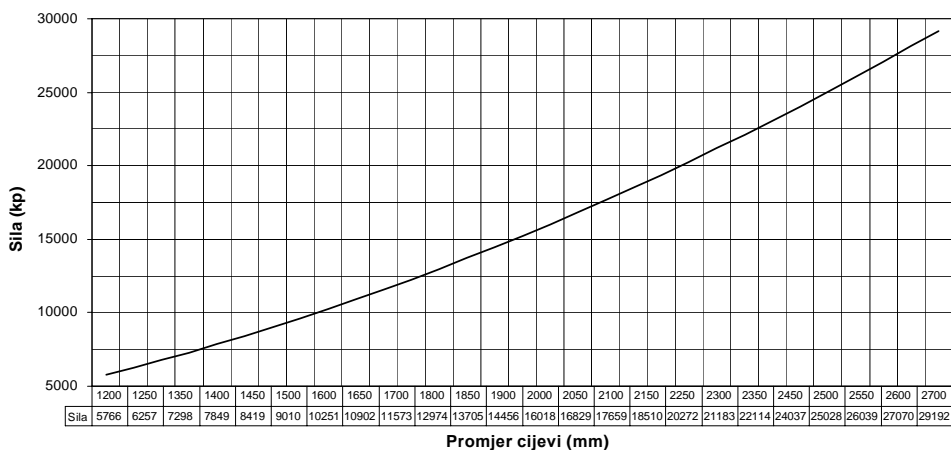


gdje je:

S - površina presjek (mm²)

p_z - tlak stagnacije(bar)

Sila u cijevi kao posljedica protutlaka od 0.5bara



Protutlak je određen visinom vodenog stupca; primjer: 10 m vodenog stupca predstavlja protutlak od 1 bara. Veličina površine i oblik vodenog stupca nisu relevantni, bitna je samo visina.

Hidrostatski tlak (tlak vodenog stupca) ovisi o visini stupca vode h, a ne o obliku.

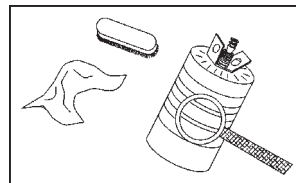
Ukoliko imate poteškoća sa razumijevanjem gornjih jednažbi, posavjetujte se sa svojim nadzorom ili odgovornim inženjerom.

- 2. Prije svake upotrebe čep očistite i provjerite ga kako na površini ne bi bio rastgan, imao ogrebotinu ili neko drugo oštećenje.**

Pneumatske čepove lako možete očistiti običnom vodom i deterdantom.

UPOZORENJE!

NIKADA NEMOJTE KORISTITI OTAPALA UGLJIKOHIDRATA ILI DRUGIH AGRESIVNIH SREDSTAVA. NJIHOVA UPOTREBA MOŽE OŠTETITI ILI ČAK POTPUNO UNIŠTITI ČEP.



Prije svake upotrebe provjerite, da pneumatski čep nema neko oštećenje, primjerice zarez, mjehuriće između gumenih dijelova, oštećen priključak ili slično.

3. Uvijek koristite precizno umjerene manometre

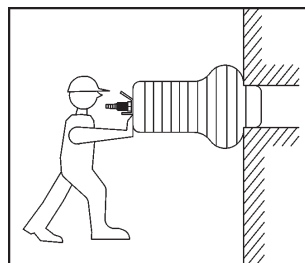
Uvijek pažljivo provjerite cijev za punjenje čepa i sigurnosne uređaje te ih po potrebi zamijenite. Pobrinite se da su sigurnosni ventili, ventili pod pritiskom i štipaljke uvijek čisti što je jamstvo za pravilan i neometan rad čepa.

UPOZORENJE!

AKO SUMNJATE DA JE PNEUMATSKI ČEP OŠTEĆEN ODMAH GA VRATITE PRODAJNOM PREDSTAVNIKU, GDJE ĆE SE UTVRDITI POSTOJI LI PROBLEM I UKOLIKO JE POTREBNO ČEP ZAMIJENITI NOVIM. AKO PRIMIJETITE NEŠTO NEOBIČNO PRILIKOM RADA SA PNEUMATSKIM ČEPOM ODMAH PREKINITE SA RADOM TE SE POSAVJETUJTE SA NADZOROM ILI OSOBOM ZADUŽENOM ZA SIGURNOST NA GRADILIŠTU.

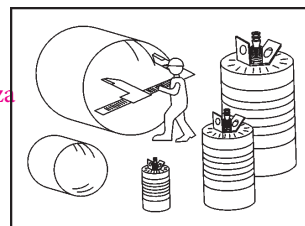
4. Uvijek odaberite pravu veličinu pneumatskog čepa

Za svaki pneumatski čep definirano je gornje i donje područje primjene. Nominalna veličina čepa, u kojoj mjeri se može koristiti, je navedena na samom čepu.



Prije upotrebe pneumatskog čepa:

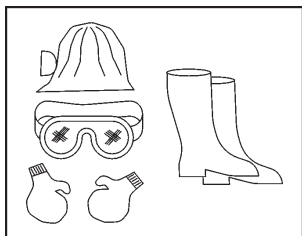
- izmjerite unutarnji promjer cijevi, u koju ćete staviti čep
- Uvjerite se da je promjer cijevi u rasponu koji je određen za čep



UPOZORENJE!

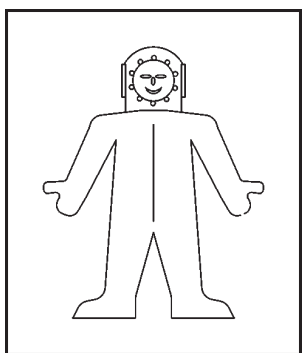
Nikad nemojte koristiti čep u cijevi čiji promjer je manji ili veći od onog koji je definiran u području primjene čepa.

5. Uvijek upotrebljavajte zaštitnu odjeću i obuću



Pri radu sa pneumatskim čepovima uvijek upotrebljavajte propisanu odjeću i obuću (naočale, kaciga, radna odjeća, čepići za uši).

Korištenje zaštitne odjeće ovisi o okolnostima u kojima se upotrebljava pneumatski čep.

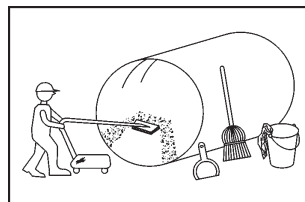


UPOZORENJE!

Uvijek nosite naočale, kacigu i rukavice.

6. Prije umetanja čepa temeljito očistite cijev

Cijev mora biti pravilno očišćena, sve oštre dijelove je potrebno ukloniti kako bi se spriječilo slabo brtvljenje i smanjivanje vrijednosti protutlaka, kao i moguća oštećenja pneumatskog čepa. Postoji nekoliko načina za čišćenje cijevi od kojih je najčešći voda pod visokim tlakom.



UPOZORENJE!

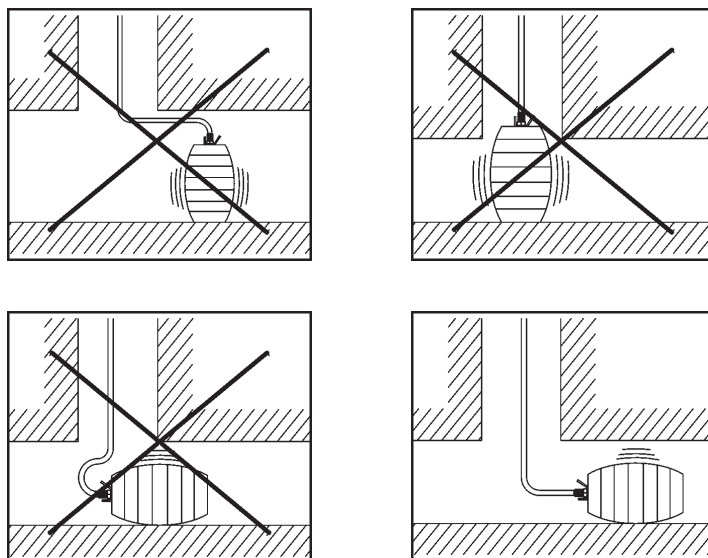
NEČISTOĆA I OŠTRI PREDMETI U CIJEVI MOGU ONEMOGUĆITI DOBRO BRTVLJENJE CJEVOVODA I UNIŠTITI PNEUMATSKI ČEP.

7. Uvijek ispravno umetnite pneumatski čep u cijev

Prije punjenja pneumatskog čepa zrakom, čep pravilno stavite u cijev: najkraća udaljenost od početka cijevi do pneumatskog čepa mora biti jednaka promjeru cijevi.

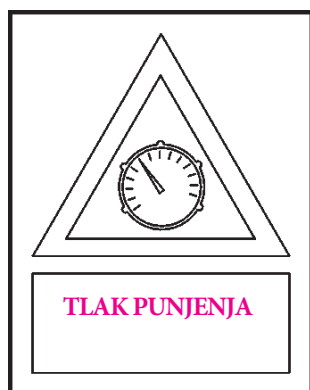
OPASNOST!

Prije i za vrijeme umetanja pneumatskog čepa poštujujte četiri osnovna pravila:



1. NIKADA NE PUNITE PNEUMATSKI ČEP IZVAN CIJEVI
2. NIKADA NE PUNITE PNEUMATSKI ČEP U PRLJAVOJ CIJEVI ILI AKO SE U NJOJ NALAZE OŠTRI PREDMETI
3. PNEUMATSKI ČEP NE SMIJE VIRITI IZ CIJEVI
4. NIKADA NE PUNITE PNEUMATSKI ČEP KROZ OTVOR

8. Nikada ne prekoračite maksimalnu dozvoljenu vrijednost tlaka



Čep napunite samo do propisanog tlaka punjenja. Pravilan tlak za punjenje je jasno naznačen na svakom proizvodu i naveden u tablici na kraju priručnika. Prilikom rada s pneumatskim čepom pratite vrijednosti tlaka punjenja i protutlaka. Pneumatski čep je konstruiran kako bi privremeno zatvorio cijev, radi čega je potrebno provjeravati protutlak svakih pet sati.

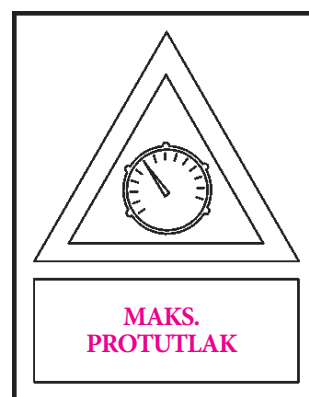
UPOZORENJE!

UVIJEK UPOTREBLJAVAJTE PREIZNO UMJERENE MANOMETRE, AKO PREKORAČITE PROPISANU VRIJEDNOST TLAKA PRILIKOM PUNJENJA MOŽEE UNIŠTTI ČEP. PREMALI TLAK PRILIKOM PUNJENJA MOŽE DOVESTI DO KLIZANJA ČEPA UNUTAR CIJEVI.

NAPOMENA: Propisani tlak punjenja je veći od minimalnog tlaka punjenja. To je jedini tlak pri kojem pneumatski čep može izdržati najveći protutlak.

9. Nikada ne prekoračite najveću dozvoljenu vrijednost protutlaka

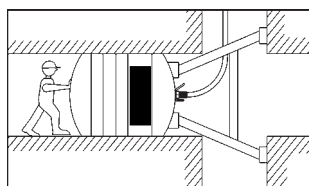
Najveći protutlak je definiran za sve pneumatske čepove, koji su stavljeni u čistu cijev. Zaprljanja u cijevi (alge, mast, naslage, pijesak, šljunak itd.) znatno smanjuju vrijednost protutlaka. ijevi koje su napravljene od materijala sa niskim koeficijentom trenja, npr. polietilen ali i nove cijevi s ostatkom masti ili drugih sredstava, direktno smanjuju koeficijent trenja a time i vrijednost protutlaka.



UPOZORENJE!

U TAKVIM OKOLNOSTIMA, TREBA SE SAVJETOVATI SA NADZOROM ILI OSOBOM ZADUŽENOM ZA SIGURNOST, KAKO BI SE OSIGURALI POTREBNI UVJETI TJ. ČIŠĆENJE CIJEVI PRIJE STAVLJANJA PNEUMATSKOG ČEPA.

10. Uvijek koristite potporu, koja omogućuje pravilno pozicioniranje u slučaju protutlaka



OPASNOST!

U SLUČAJEVIMA KADA SE PREDVIĐA DA ĆE PROTUTLAK BITI PREKORAČEN, POTREBNO JE UPOTRIJEBITI POTPORU KOJA ĆE SPRIJEČITI KLIZANJE ČEPA.

Nikada ne koristite "kvačice" ili ručke na čepu, one su namijenjene samo za spuštanje i dizanje pneumatskog čepa i nisu konstruirani na način da mogu izdržati veliku silu koju stvara protutlak.

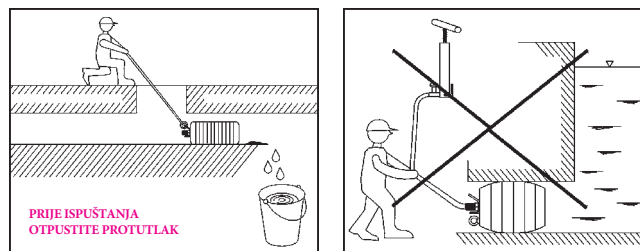
11. Ne zadržavajte se u blizini čepa koji je pod tlakom

Opasno se zadržavati u blizini čepa ili u blizini rupe u kojoj se nalazi pneumatski čep pod tlakom.



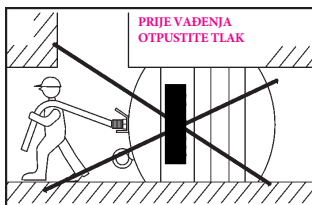
OPASNOST

NE ZADRŽAVAJTE SE U OPASNOJ ZONI. NEPOŠTIVANJE TOG PRAVILA MOŽE IMATI TEŠKE POSLJEDICE, ČAK I SMRT.



12. Uvijek otpustite protutlak, a zatim ispraznite pneumatski čep

Prije uklanjanja pneumatskog čepa potpuno otpustite protutlak. Tek tada kroz cijev kojom ste punili isпустите tlak iz čepa. Pneumatski čep je potrebno potpuno isprazniti prije vađenja iz cijevi.



UPOZORENJE!

IZVADITE ČEP IZ CIJEVI TEK KADA JE ČEP U POTPUNOSTI PRAZAN. NIKADA GA NE VADITE POMOĆU CIJEVI ZA PUNJENJE. UVIJEK UPOTREBLJAVAJTE UŽE, KOJE JE PROVEDENO KROZ UŠICE ILI RUČKE. UPORABA CIJEVI ZA PUNJENJE MOŽE OŠTETITI ČEP ILI SAMU CIJEV, I DOVESTI DO OPASNOSTI PRILIKOM NEPRAVILNOG KORIŠTENJA OPREME.

Nepoštivanje uputa i sigurnosnih mjera prilikom rada s pneumatskim čepovima može dovesti do TEŠKIH OZLJEDA ili čak SMRTI.

**PLEASE READ AND UNDERSTAND
THIS MANUAL BEFORE
USING PNEUMATIC
PIPE PLUGS**

PNEUMATIC PIPE PLUGS

SAFETY INSTRUCTION MANUAL

**NONOBSERVANCE OF INSTRUCTIONS AND WARNINGS FOR SAFE OPERATION OF PNEUMATIC
PLUGS CAN DAMAGE PRODUCTS, CAUSE SERIOUS BODILY INJURIES OR EVEN DEATH.**

TWELVE RULES FOR SAFE OPERATION OF PNEUMATIC PLUGS

1. Stay clear of the plug when under pressure (11)
2. Always wear protective clothing and equipment (5)
3. Always use accurate air pressure gauges (3)
4. Never exceed the maximum inflation pressure for the plug (8)
5. Never exceed the maximum allowable back pressure (9)
6. Always provide support and/or bracing to secure the plug when back pressure is present (10)
7. Always release the back pressure first before deflating the pneumatic plug (12)
8. Before and after each use, clean the plug and inspect for surface tears, cuts or any other damage (2)
9. Always choose the proper size of pneumatic plugs (4)
10. Before insertion of the pneumatic plug thoroughly clean the pipeline (6)
11. Always correctly insert the pneumatic plug into pipeline (7)
12. Always determine the back pressure that the pneumatic plug will have to resist during the application. (1)

SIX STEPS FOR USE OF PNEUMATIC PLUGS FOLLOWING THE TWELVE RULES FOR SAFE OPERATION

HOW TO CHOOSE THE CORRECT PNEUMATIC PLUG?

1. Always determine the back pressure that the plug will have to resist during use
2. Always choose the proper size of the plug by measuring the internal diameter of the pipe

HOW TO PREPARE THE PNEUMATIC PLUG AND THE PIPELINE?

1. Prior to each and every use, clean and inspect the plug for any visible surface tears, cuts or any other damage
2. Always check air line connections and hoses to make sure they are not leaking
3. Always remove dirt and debris from the pipe before inserting the plug

USE OF SAFETY DEVICES

1. Always wear protective clothing and equipment
2. Always use safety support or bracing for the plug
3. Use only properly calibrated air pressure gauges

CORRECT INSERTION OF THE PLUG INTO THE PIPE

1. Be sure that the plug is fully inserted into the pipe so that no part of its is protruding when inflated
2. At first, inflate the plug only until it touches the pipe wall. Then slowly and carefully build up the pressure up to the maximum allowable inflation pressure

PROPER USE OF THE PLUG INSIDE THE PIPE

1. Stay clear of the pneumatic plug while inflated
2. Never exceed the maximum inflation pressure for the plug in use
3. Never exceed the maximum allowable back pressure

PROPER REMOVING OF THE PLUG FROM THE PIPE

1. Always release the back pressure before deflating the plug
2. Do not pull on the air hose to remove the plug

INSTRUCTIONS FOR USE OF PLUGS

In order to prevent exceeding the permissible pressure during inflation plugs should be used in the combination air source – pressure regulator – controller – air supply hose – plug. Never left the controller out of this combination and connect the pressure regulator directly to the plug. Controllers are equipped with safety valves and pressure gauges that are calibrated to the adequate pressure area.

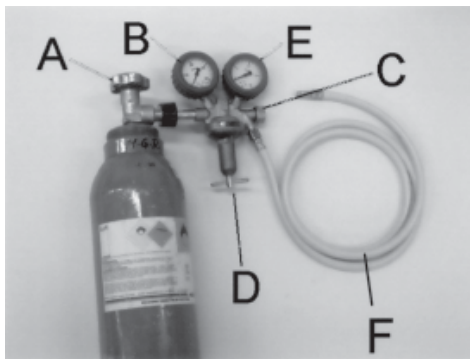
Before using a plug set the prescribed pressure by means of the pressure regulator. The pressure value may not exceed the maximum permissible supply pressure. Connect the plug with a hose to the controller, which is further connected to the air source and insert the plug correctly in the pipeline (see instructions for safe work). Draw back from the dangerous area. You may open the plug inflation valve on the controller only after all safety measures have been followed. During the inflation check the working pressure on the pressure gauge. When the maximum permissible pressure is reached, stop the inflation. In case of a longer plug use the pressure in the plug may drop therefore check the pressure; should the pressure drop, correct it adequately.

Air supply

Any air source, which does not exceed the maximum supply pressure on the controller may be used to inflate the plug. If the supply pressure is higher than allowed, use the pressure regulator. If the compressed air contains oil, use the oil separator.

Use of compressed-air cylinder under pressure of 200 or 300 bar

Use a joining piece to connect the pressure regulator to the compressed air cylinder. Shut the air outlet on the pressure regulator by screwing down the regulator valve (C) of the pressure reducer. Open the valve (A); pressure gauge (B) indicates the air pressure in the compressed air cylinder.

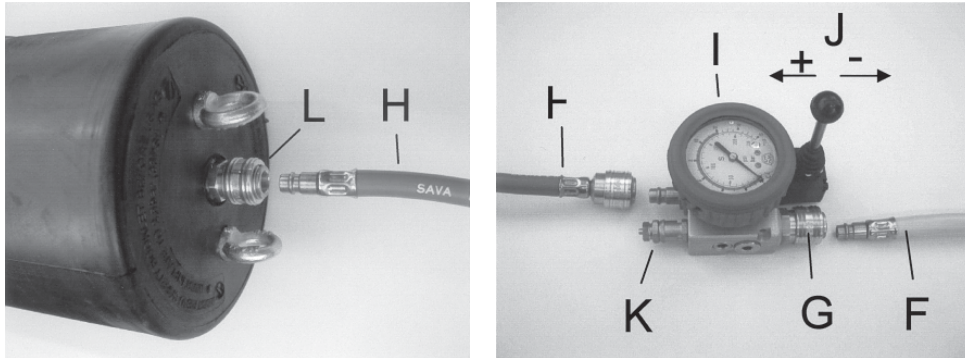


By means of a regulator valve (D) set the outlet pressure to the suitable value as indicated on the pressure gauge (E) and repeatedly open the regulator valve (C).

Plug inflation by a controller

Connect the air supply hose on the pressure regulator (F) with the controller (G). Insert the male into the female hose connection and press to mesh.

Connect the controller through the supply hose (H) with the plug (L). Connect the joining piece of the supply hose with the plug coupling and press to mesh both pieces.



If other compressed air sources are used, set the supply pressure to the value that does not exceed the maximum supply pressure indicated on the controller.

Inflate the packer by pushing the lever (J) towards the pressure gauge. Continually check the pressure gauge (I) indicating the pressure in the plug.

When the working pressure is reached, interrupt the procedure and release the lever. The lever automatically returns to its neutral position (safety position).

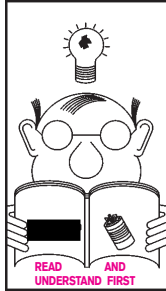
If the pressure in the packer exceeds the maximum inflation pressure indicated on the pressure gauge, it is automatically released by the safety valve (K).

If you wish to empty the plug or reduce the plug pressure turn the lever (J) away from the pressure gauge.

Use of other air sources

If other compressed air sources (industrial installations, compressors etc.) are used, various adapters should be applied. If the compressed air source exceeds the maximum supply pressure indicated on the controller, use the pressure regulator and reduce the pressure to the prescribed value.

INSTRUCTIONS FOR SAFE OPERATION



Instructions for safe and correct operation of pneumatic plugs

WARNING!

BEFORE USE OF PNEUMATIC PLUGS, PLEASE READ THE INSTRUCTIONS VERY CAREFULLY. THE INSTRUCTIONS APPLY TO ALL SIZES AND TYPES OF PNEUMATIC PLUGS. THE INSTRUCTIONS MUST BE MADE AVAILABLE FOR ALL USERS OF PNEUMATIC PLUGS.

Recommendations, demands and instructions for use of pneumatic plugs apply to all sizes and types of pneumatic plugs.

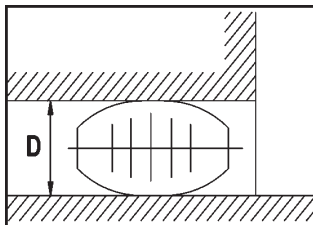
Instructions given for construction, production and inspection of products always include a high level of safety which does not bind the manufacturer only but the user as well. The user and the manufacturer shall always bear in mind safe and correct procedures when using pneumatic plugs.

Read instructions carefully. Should you have any questions or if any extraordinary circumstances appear - not stated and described in this brochure - consult your supervisor or safety engineer.

1. Always determine the back pressure that the pneumatic plug will have to resist during the application

WARNING!

DURING USE OF THE PNEUMATIC PLUG - WHEN IT IS INSERTED IN A PIPELINE AND FILLED WITH AIR - POWERFUL FORCES MAY EMERGE IN AND BEHIND THE PLUG. THE TOTAL FORCE IMPACTING THE PNEUMATIC PLUG IS PROPORTIONAL TO THE PRESSURE AS WELL AS THE SURFACE OF THE PIPELINE OPENING. BACK PRESSURE LEVELS FOR INDIVIDUAL PNEUMATIC PLUGS ARE GIVEN IN THE TABLES AT THE END OF THE BROCHURE.

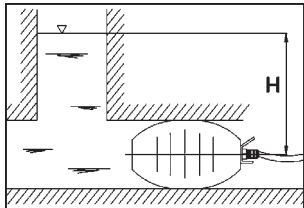


1. Measure the inner diameter D (mm) (in) of a pipeline to be blocked with the pneumatic plug.
2. Calculate the surface S (mm²) of the pipeline cross-section according to the following equation:

$$S = \pi \cdot \frac{D^2}{4} \quad (\text{mm}^2) \quad (\text{in}^2)$$

where $\pi = 3,1416$

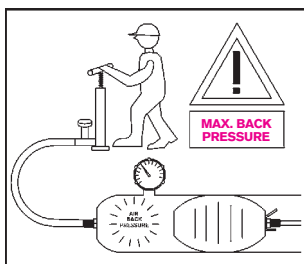
D - inner pipe diameter (mm) (in)



3. Calculate the total force that the plug has to resist according to the following equation:

$$F = p_z \cdot S \cdot 0.1 \text{ (N)}$$

$$F = p_z \cdot S \text{ (Lbf)}$$

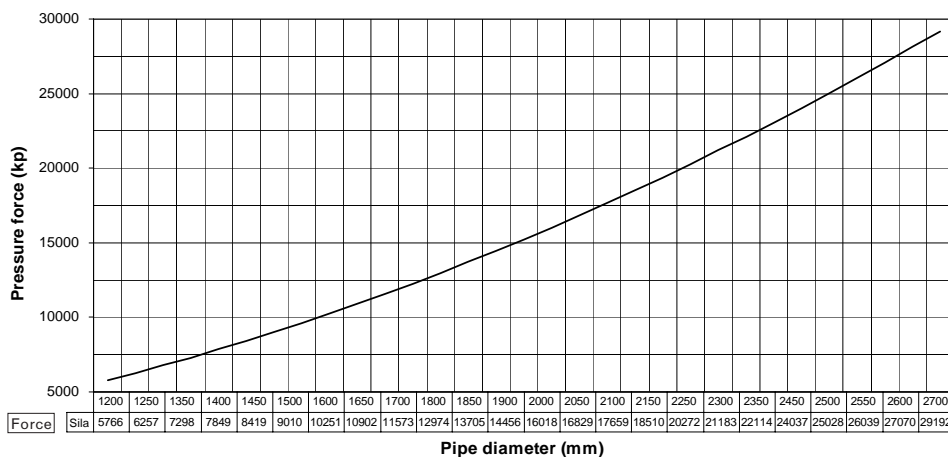


where

S - cross-section surface (mm²) (in²)

p_z - back pressure (bar) (PSI)

Force in plug as result of back pressure 0.5bar



The back pressure P_z is defined with the water column height behind the plug, e.g. a 10-meter-high (32,8 ft) water column means a back pressure of 1 bar (14,4 PSI), the surface size and the water column shape are not important, the height is only important.

Hydrostatic pressure (water column pressure) depends on the water level height h above the measurement spot and not on the shape.

Should any questions regarding the equations arise, please consult your supervisor or responsible engineer.

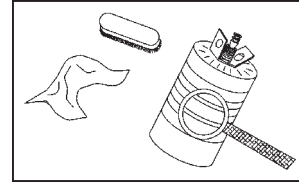
2. Before and after each use, clean the plug and inspect for surface tears, cuts or any other damage

Pneumatic plugs can be cleaned with a solution of water and detergent. After clean-

WARNING!

NEVER CLEAN WITH SOLVENTS, HYDROCARBONS AND OTHER AGGRESSIVE AGENTS FOR THE PLUG CAN BE DAMAGED OR EVEN DESTROYED.

Before and after use carefully check the pneumatic plug for any damages, such as cuts, blisters between rubber layers, worn out parts, damaged connections, etc.



3. Always use accurate air pressure gauges

The pneumatic packer may only be connected and operated through a single fitting controller or a comparable controller with a pressure regulator (1.5 or 2.5 bar).

Always carefully check plug inflation hoses, control and safety devices, and replace them, if required. See that safety valves, pressure valves and clamps are clean which will assure undisturbed and correct plug operation.

WARNING!

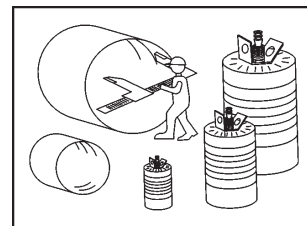
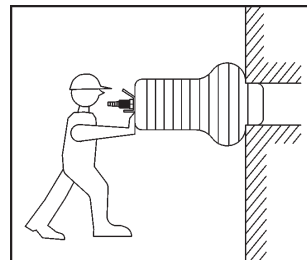
IF YOU SUSPECT THAT THE PNEUMATIC PLUG OR ACCESSORIES ARE DAMAGED, CONSULT REPRESENTATIVE AND AGREE ON RETURNING OF THE PRODUCT TO BE INSPECTED AT OR SCRAP THE PRODUCT AND REPLACE IT WITH A NEW ONE. IF YOU NOTICE ANYTHING EXTRAORDINARY, REMOVE THE PLUG AND ADVISE THE SUPERVISOR OR SAFETY ENGINEER.

4. Always choose the proper size of pneumatic plugs

For each pneumatic plug the lower and upper range of application is defined. The nominal size of the plug or the range in which it may be used is clearly marked on the plug itself.

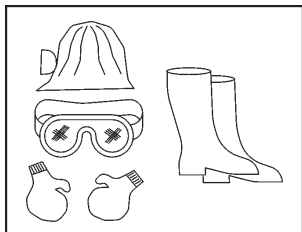
Before using the pneumatic plug always:

- measure the inner pipeline diameter in which the plug will be inserted
- make sure the pipeline diameter is within the range defined for the plug



WARNING!

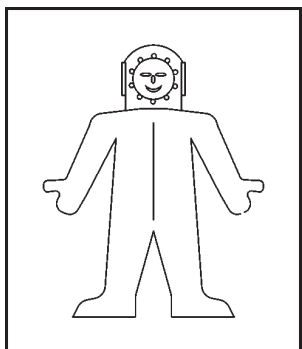
NEVER USE THE PLUG IN PIPELINES OF A LARGER OR SMALLER DIAMETER AS DEFINED FOR THE RANGE OF APPLICATION.



5. Always wear protective clothing and equipment

When handling pneumatic plugs always use required protective equipment (goggles, helmet, ear plugs and clothing).

The use of protective equipment depends on circumstances in which pneumatic plugs are used.

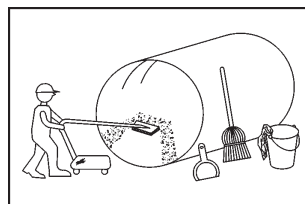


WARNING!

ALWAYS WEAR PROTECTIVE GOGGLES, HELMET AND GLOVES.

6. Before insertion of the pneumatic plug thoroughly clean the pipeline

The pipeline should be properly cleaned, all sharp particles removed in order to prevent poor sealing and decrease of back pressure values as well as possible damages of pneumatic plugs. There are several ways to clean the pipe: high water pressure and cleaning with the so called milling robots at the simultaneous water injection.



WARNING!

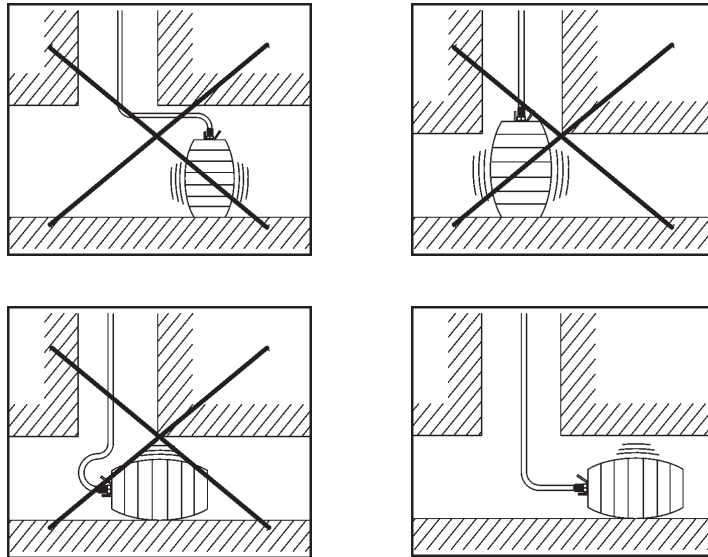
DIRT OR SHARP PARTICLES IN THE PIPELINE CAN CAUSE POOR SEALING OR EVEN DAMAGES TO THE PNEUMATIC PLUG.

7. Always correctly insert the pneumatic plug into pipeline

Before inflating pneumatic plug with air, place it correctly in the pipeline: the shortest distance from the beginning of the pipeline to the pneumatic plug shall equal the pipeline diameter. During inflation some of the plugs expand also in axial direction.

DANGER

Before and during inserting pneumatic plugs follow the four basic rules:



1. NEVER INFLATE PNEUMATIC PLUG OUTSIDE THE PIPE
2. NEVER INFLATE PNEUMATIC PLUG IN DIRTY PIPE OR WHEN SHARP PARTICLES ARE PRESENT
3. PNEUMATIC PLUG MAY NOT SPACE OUT OF THE PIPE
4. NEVER INFLATE PNEUMATIC PLUG THROUGH OPENING



8. Never exceed the maximum inflation pressure for the plug

Inflate the plug only to the prescribed inflation pressure. The correct inflation pressure is clearly marked on each product and given in the tables at the end of the brochure. During work with plugs accurately measure and pursue the inflation and back pressure values.

Pneumatic plugs are designed for temporary pipeline blocking which is why it is required to check the pressure at least every 5 hours.

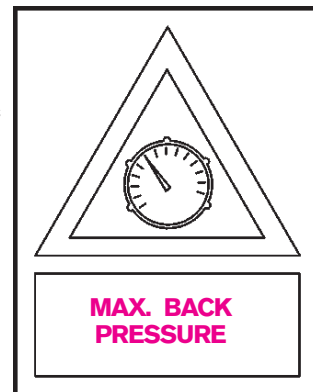
WARNING!

ALWAYS USE ACCURATELY CALIBRATED GAUGES. EXCEEDING PRESCRIBED INFLATION PRESSURE CAN DAMAGE OR EVEN DESTROY THE PLUG. UNDERINFLATED PLUGS CAN SLIP OUT OF THE PIPELINE.

NOTE: The prescribed inflation pressure is both the maximum as well as the minimum inflation pressure. It is the only inflation pressure at which the pneumatic plug will hold the maximum allowable back pressure.

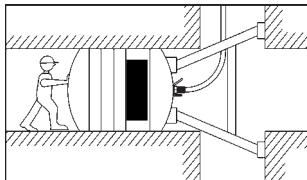
9. Never exceed the maximum allowable back pressure

Maximum back pressures are defined for those pneumatic plugs which are inserted into clean and dry plugs. Dirt in pipes (algae, grease, detergents, mildew, sand etc. can considerably decrease the back pressure values. Pipelines made of materials with lower coefficient of friction, e.g. polyethylene or new pipelines with remains of grease or agents directly decrease the coefficient of friction as well as the back pressure values.



WARNING!

IF SUCH CIRCUMSTANCES ARISE, IMMEDIATELY CONTACT THE SUPERVISOR OR SAFETY ENGINEER IN ORDER TO DEFINE PROPER MEASURES, E.G. PIPELINE CLEANING BEFORE INSERTION OF THE PNEUMATIC PLUG.



10. Always provide support and/or bracing to secure the plug when back pressure is present

DANGER

IN CASES WHEN REACHING AND EXCEEDING THE LIMIT BACK PRESSURE IS ANTICIPATED, ANCHORING OR BRACING MUST ALWAYS BE USED IN ORDER TO SAFELY PREVENT THE PLUG FROM SLIPPING. (FOR AXIAL FORCES SEE DIAGRAM/TABLE ON PAGE 4).

THE WATER PRESSURE IN THE PIPE MAY NOT EXCEED 0.5 BAR = 5M WATER COLUMN.

Never use ring bolts or holders fitted on the plug as a safety device for they are only intended for lowering and lifting of pneumatic plugs. They are not designed to transfer powerful forces initiated by back pressures.

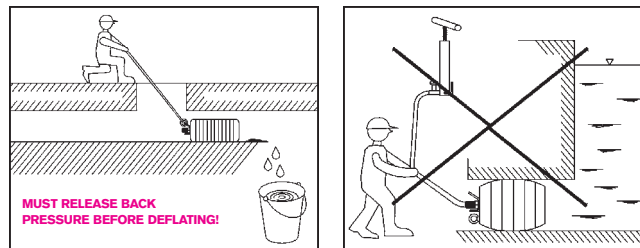
11. Stay clear of the plug when under pressure

It is dangerous to stand near a pipe or a manhole containing a pneumatic plug under pressure.



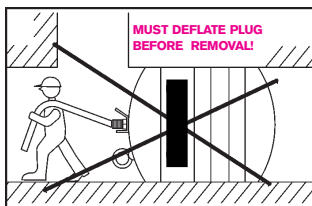
DANGER

STAY CLEAR OF THE DANGER ZONE. NOT FOLLOWING THE INSTRUCTIONS CAN RESULT IN SERIOUS INJURIES OR EVEN DEATH.



12. Always release the back pressure first before deflating the pneumatic plug

Before deflating the pneumatic plug completely, release the back pressure. Only then the pressure in the plug can be released through the inflation hose. Pneumatic plug must be completely deflated before removing from the pipeline.



WARNING!

REMOVE THE PLUG ONLY WHEN COMPLETELY DEFLATED. NEVER REMOVE IT WITH INFLATION HOSE. ALWAYS APPLY A ROPE IN RING BOLTS OR HOLDERS. USE OF THE INFLATION HOSE CAN DAMAGE THE PLUG OR THE INFLATION HOSE TO WHICH THE USE OF THE PLUG ITSELF OR ITS ACCESSORIES CAN BE DANGEROUS.

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