OPERATING AND MAINTENANCE MANUAL FOR PERSKE MOTORS

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www.crpperske.com

INTRODUCTION

We at CRP appreciate your purchase of this PERSKE motor. When properly installed, operated, and maintained, the PERSKE motor will provide a lifetime of reliable operation. It is MANDATORY that the person who operates, inspects, and maintains this equipment thoroughly reads and understands this manual.

PERSKE motors are manufactured with care and precision. During the manufacturing process, quality checks are made continually to ensure the highest quality levels. Every motor undergoes a full run in test, and every spindle is balanced to a tolerance no greater than 1.8 mm/sec. at full motor rated speed. As with any precision built item, special care must be taken with regard to operation and maintenance to assure satisfactory performance. This instruction manual has been designed to serve as a self-contained guide for the proper installation, operation, and maintenance of the PERSKE motor.

If you require additional assistance, please feel free to contact either your local supplier or CRP toll free at 800-526-4066 (in New Jersey 609-578-4100).
THANK YOU!

Perske Motor Repair Facility & Technical Support

CRP Industries Inc. (CRP) is the home of a state of the art Perske motor repair facility. We have factory trained technicians who provide the following services: motor repairs (including rush repairs) and on-site or telephone technical support for motors and frequency inverters. If your Perske motor is in need of maintenance or repair please contact us with a brief description of the issue to receive a return materials authorization (RMA) number and shipping instructions.

CRP Industries Inc., 35 Commerce Drive, Cranbury, NJ 08512 USA

Telephone: 800-526-4066 or 609-578-4100
Fax: 609-578-4112 or email: industrialcs@crpindustries.com

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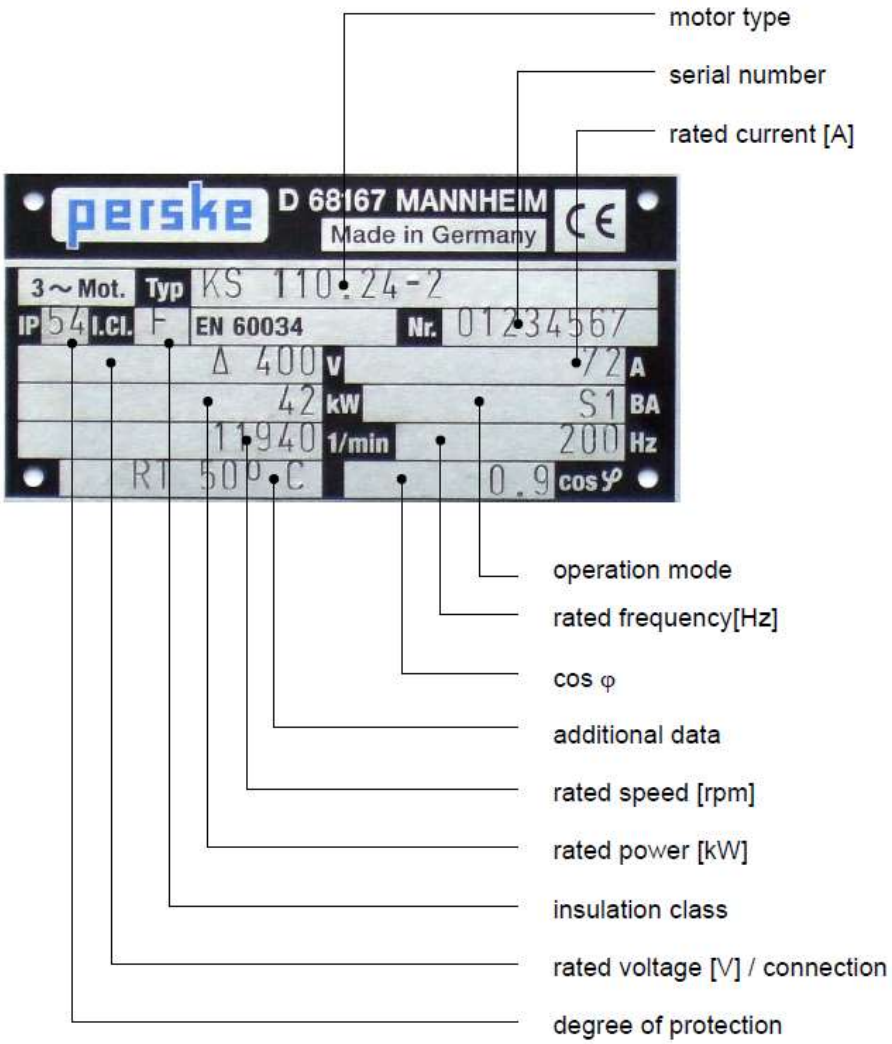
1. OPERATING INSTRUCTIONS FOR PERSKE MOTORS

PERSKE motors are manufactured with precision and thoroughly tested before leaving the PERSKE factory.

Due to the demands placed on these motors, it is important to observe certain operating procedures to avoid damage and premature failure.

Upon receipt of your PERSKE motor, please inspect for damage or missing parts and verify the accuracy of the name plate. Report any issues to the freight carrier and to CRP, referencing the motor type, serial number, purchase order and bill of lading number. A claim must be filed with the freight carrier for any damage incurred during shipment.



1.1. Tooling

Only use balanced tools and follow the detailed PERSKE tooling recommendations. Always check the tool to ensure sharpness and balance. Tooling with a vibration effective value greater than 2.8mm/sec. (at rated speed) should not be used.

1.2. Bearings and Lubrication

1.2.1. Bearings

Perske three-phase motors are equipped with special bearings manufactured for the specific motor application. The bearing abbreviated part number does not provide the full technical specifications for the bearing. For replacement bearings please see § 1.8 of this manual.

1.2.2. Lubrication Applicability

Most motors are equipped with lifetime lubricated bearings. In such cases, the motor will not have grease fittings. No lubrication schedule is necessary. When motors come equipped with grease fittings follow the lubrication instructions identified in § 1.2.3.

1.2.3. Lubrication Instructions

All motor bearings come pre-lubricated. DO NOT grease the motor until its recommended interval. For re-lubrication use a Klueber Isoflex Topas NB52. It is suggested that other grease types be checked with CRP for suitability before use. Prior to lubrication, clean grease nipples carefully to prevent dust or dirt from entering. Contamination with dust or dirt will cause premature bearing failure.

DO NOT OVER GREASE as this will lead to excessive heat buildup. Bearing temperature as measured on the housing should not exceed 160° F (70° C). If bearing temperature exceeds 160° F (70° C) immediately shut down and contact CRP.

Motor Size	Lubrication Frequency Per Operating Speed			Lubricant Used (g)	
	≤3,000 rpm	6,000 rpm	9,000 rpm	D-side	ND-side
KN 70	12,000 h	8,000 h	8,000 h	5	5
KN 70 D	12,000 h	8,000 h	8,000 h	8	8
K 80	12,000 h	8,000 h	5,000 h	6	6
K 90	12,000 h	8,000 h	5,000 h	10	5
K110	8,000 h	5,000 h	5,000 h	35	10

Note: Lubrication instruction is valid for standard versions. Motors with differing intervals and / or quantities of grease, have their own type-specific instruction. In this case, plates with necessary descriptions are mounted to the motor.

1.3. Vibration

Vibrations dramatically reduce bearing life and will cause premature bearing failure. As such, vibrations must be avoided.

1.3.1. Vibration Causes

Causes of vibration may be:

- Unbalanced tooling
- Improperly clamped work piece
- Excessive feed rates
- Worn or dull tools

Contact CRP for specific tooling recommendations with respect to max. size and weight.

1.3.2. Levels

Vibration levels are described as follows in accordance with ISO 10816 Part 1/Part 3 and VDI 2056:

Level	Level Vibration (mm/s) at Speed		Motor State
	≤ 9000 RPM	>9000 RPM	
A	0 – 1.2	0 – 0.7	New/delivery status
B	>1.2 – 2.8	>0.7 – 1.8	Suitable for continuous duty
C	>2.8 – 7.1	>1.8 – 4.5	Useful for a short time – will require maintenance
D	>7.1	>4.5	Beyond allowable specification

1.3.3. Corrective Actions

If motors are vibrating excessively the following actions may be taken:

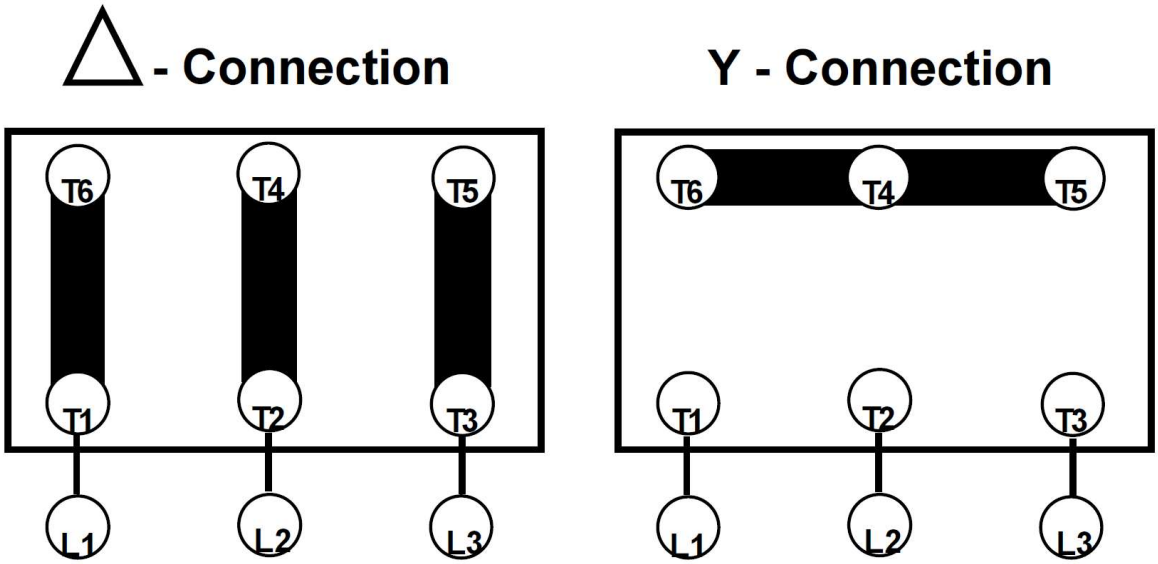
- Only use tools with a balance quality of G6.3 or better. In some cases where the tool is very large or the motor is operating at high speeds a balance quality of G2.5 may be required.
- For applications with very heavy tools, a run-up period with vibration monitoring is advised. If the motor assembly (with tooling) reaches a critical bending speed during the run-up the damage to the motor will be minimized and the tool may be changed out.
- Motors should be rigidly mounted
- External components should not come into contact with motor during operation
- Movement paths should be smooth to minimize shock loading

1.3.4. Balancing with Key

Motors are precisely balanced according to DIN EN 60034-14 considering the agreement concerning the type of the keys according to DIN ISO 8821 (“H” = half and “F” = full key balancing) when applicable. In such cases, this will be indicated by a marking on the shaft or with a sticker on the drive end-bearing shield (H = half and F = full balancing accord to DIN / ISO 8821). In the case of half key balancing (H) the tool must be balanced with half key as well. Motors with half key must not be used/run without tooling.

1.4. Electrical

Before connecting the motor, ensure that connecting voltage, frequency and the connection mode conform to the specifications of the name plate. Connect wires as shown on the sketch in the connection/terminal box, making sure that all terminal clamps are tight. Check clamp tightness once a year. All electrical work must be carried out by a qualified electrician. NEC and local applicable electrical codes must be observed (This also applies to auxiliary circuits). If installation is in violation of any applicable rule or code, any claim for damage to either material or personnel will be declined. Connections must be made in such a way to ensure that a permanent safe electrical connection is maintained (no protruding wire ends). Use only corresponding cable and pieces. Make a safe earth continuity connection. The terminal box must not contain foreign bodies, dirt or humidity. Operation with an open terminal box, including testing, is strictly prohibited. When running the motor, operator shall confirm correct rotation direction.



Before closing the terminal box check air gaps, the smallest gaps allowed are:

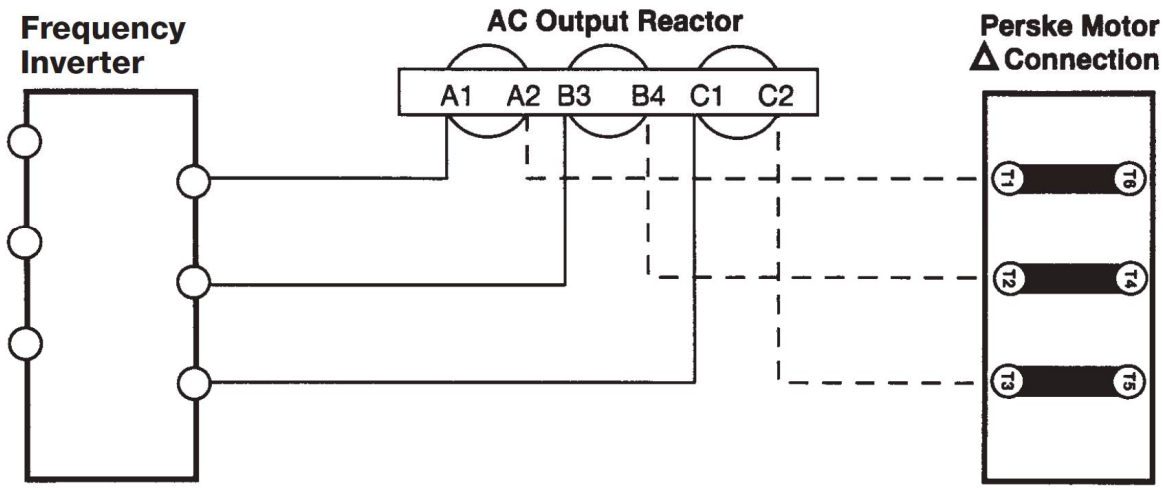
≤	500	V -	8 mm
≤	660	V -	10 mm
≤	1,000	V -	14 mm

1.4.1. Inverters

This section is only applicable to motors which are being driven by a frequency inverter. If the motor is being driven by a variable frequency drive the information in this section is not relevant.

PERSKE high frequency motors can be driven by high frequency, 3 phase power. Optimum operation and lowest motor temperatures are achieved when using a dynamic frequency converter delivering a true sinusoidal wave form. IF A SOLID STATE FREQUENCY CONVERTER (INVERTER) IS BEING UTILIZED, A THREE PHASE LINE REACTOR SHALL BE USED TO LIMIT VOLTAGE SPIKES AND CURRENT RIPPLE.

*Special Note: Failure to operate without a three phase line reactor voids any PERSKE's limited warranty.



1.5. Cleaning

The tool holder assembly (if applicable), spindle shaft taper as well as the fan cover should always be kept cleaned and clear of dust and dirt build-up. Compressed air is a sufficient method of removing most dust and dirt from the motor exterior. The motor must be operating at its rated speed to ensure proper sealing protection when using compressed air. Wipe down the tool holder and spindle shaft routinely with an oil cleaner. With a new motor, the cosmolene which has been applied to the shaft for protection during transport must be removed.

If applicable, the labyrinth is only active while rotating in order to avoid intrusion of foreign bodies. This must be considered while cleaning the motor.

*Special Note: All Cosmolene must be removed from the tool taper and all moving parts. Failure to do this will void any PERSKE guarantee.

1.6. Operating Conditions

Should the operating conditions of the motor change (temperature rise, noise level, vibration, amperage draw); shut down the motor immediately to avoid further damage. Please document the problem as accurately as possible. Supply this documentation to CRP.

1.7. Spare Parts

For spare parts, service or technical information, call CRP; toll free at 800-526-4066 (In NJ 610-587-4100). Please specify motor type and serial number of the motor. Only original PERSKE spare parts retain the value and operation of the motor.

FAILURE TO COMPLY WITH ANY OF THE AFOREMENTIONED CRITERIA VOIDS PERSKE LIMITED WARRANTY.

1.8. Transportation

Any damage detected due to shipping, should be immediately noted and reported to the transport company. Commissioning must be postponed.

Eyebolts are only designed for the weight of the machine; additional loads are not to be added. If necessary, use adequately dimensioned transporting equipment (e.g. Rope guides). The

machines are only to be transported observing all safety regulations and according to its intended use. Shafts and terminal boxes are not to be damaged. Use provided eyebolts.

1.9. Storage, Maintenance and Run-In Procedure

All Perske motors undergo a bearing run-in procedure before distribution. To maintain ideal lubrication during a standstill period, the shaft must be rotated manually ten times every three months. After switching on a cold motor, a warm-up period without load is recommended, especially prior to first commissioning. Maximum storage time, without loss of remaining lifetime, is two years. This applies to ideal conditions such as dry rooms, free of dust and vibrations (Veff <0,2 mm / s). If the storage time is more than 2 years between shipping and commissioning, the bearings should be replaced. After a longer storage time the winding impedance should be measured prior to use. If the value is < 1,000 Ω / V the windings have to be dried out. For motors with re-lubrication devices, a bearing run-in procedure needs to be fulfilled after relubrication.

The following instruction is valid for:

- motors with rated powers up to 20 kW and speeds > 9,000 rpm
- motors with rated powers over 20 kW and speeds > 3,000 rpm

Maintaining the ideal service life of grease during longer standstill periods:

Standstill period	Procedure
≤ 3 months	No special procedure necessary
> 3 months	Shaft has to be rotated manually 10 times every three months
> 2 years	Replace bearings

Procedure of running-in the cold motor after a standstill period:

Standstill period	Motor Type		
	KN20, KR35, KN50, KR 50, V30, V50, V60	KN60, KR60, KN70, KC70, KR70, K80, KR80	K110, K140, K160, K200
<1 month	Warm up without load: 5 min. at 0,5 x n_max 15 min. at 1,0 x n_max	Warm up without load: 10 min. at 0,5 x n_max 10 min. at 1,0 x n_max	Warm up without load: 30 min. at 0,5 x n_max 30 min. at 1,0 x n_max
≥1 month < 2 years	Warm up without load: 15 min. at 0,5 x n_max 15 min. at 1,0 x n_max	Warm up without load: 30 min. at 0,5 x n_max 30 min. at 1,0 x n_max	Warm up without load: 90 min. at 0,5 x n_max 90 min. at 1,0 x n_max

2. GUIDELINES FOR QUALITY ROUTING

The importance of the cutter bits used in CNC routing is generally underestimated. It is often assumed that the cutters which were successfully used for manual methods of routing will work in the CNC router. This is incorrect in many situations. The requirements of a cutter in the CNC router are very different from those used in a pin router. A CNC router will often have an 80% duty cycle. This means the cutter will be in the work piece 80% of the time. This compares with 10 to 15% for a manual pin router. Also, a CNC router will push the cutter through the material at a much faster feed rate than a manual router. The significance of these two differences is that the cutter will run much hotter with a CNC router. Excessive heat will destroy router bits quickly.

2.1. Cutter Balance

The most important tooling recommendation is that only sharp, dynamically balanced tools be used in CNC routers. Tooling with a vibration effective value greater than 2.8 mm/sec. (at rated speed) should not be used. Have your tooling manufacturer provide documentation showing your particular tools' balance measurements.

2.2. Cutter Size

Tools should never be longer than necessary. Extra cutting length causes vibration, deflection and poor edge quality. The cutting length should never exceed four times the shank diameter. Always use the largest diameter shank possible. Large diameters increase tool strength and reduce possibilities of breakage.

2.3. Collets

Routinely inspect the collet for wear. Worn collets usually account for the majority of tool breakage. Increased breakage and dark markings on the tool shanks indicate slipping of the tool due to wear, or dust build-up. Regular inspections of the collet are required to ensure maximum productivity. ROUTER BITS SHOULD BE INSERTED THE FULL LENGTH OF THE COLLET AND TAPER TO INSURE MAXIMUM SAFETY AND PREVENT BREAKAGE. For proper collet installation and removal, the collet must be inserted into the covernut until you hear a click and/or feel it lock into place before placing it on the motor shaft.

2.4. Plunging

Plunge routing produces very severe axial loads on the tool as well as the router motor. To reduce these axial loads, plunge tip cutter bits should be used. IF AT ALL POSSIBLE, THE ROUTER MOTOR SHOULD BE ALLOWED TO ENTER THE MATERIAL FROM THE SIDE IN AN EFFORT TO REDUCE AXIAL LOADING.

2.5. Sharpness

The CNC router will push a dull tool through the material it is cutting; however, the radial (side) loads that the router motor will experience may severely damage the spindle shaft and cause premature bearing failure. It is imperative to monitor the sharpness of your tooling. Tools should be changed at the first sign of poor edge quality or increase in operator effort to maintain feed rates. A CNC router does not recognize if a tool's edge is dull or sharp. Therefore, when a tool is dull it no longer cuts, and will instead be forced through the material.

2.6. Feed Rates

Adhere to the set feed rates of the machine and tool per the specific application. Underfeeding (slow feed rates) can cause excessive heat build-up and therefore excessive friction and burning. This results in limited tool life. Overfeeding (excessive feed rates) can result in tool breakage. The router bit should be allowed to "bite" or "cut" its way freely through the material. It will sometimes be necessary to reduce feed rates to obtain maximum cutter life.

If you experience unsatisfactory performance from your cutter, there is no single solution which will work in all situations. Every situation is different and may require a slightly different solution. The first step is to contact your tool manufacturer and explain your problem. CNC machines have received widespread acceptance and use. Most tool manufacturers have experience in recommending tooling for CNC routers. It is of critical importance that you use tools which are designed for the demands of your application and the high speeds of your router motor.

3. TOOLING RECOMMENDATIONS FOR PERSKE MOTORS

3.1. General

- The inside taper of the spindle, collet, covernut thread, and all surfaces including tooling must be cleaned of dust and dirt build-up before installation and at regularly scheduled intervals.
- To tighten the nut, only an original PERSKE wrench is to be used. Do not use an extension rod (pipe).

3.1.1. Mounting of Tool

- Insert the PERSKE collet into the PERSKE covernut until you here a click and/or feel it lock into place, and screw both together onto the spindle shaft. DO NOT tighten.
- Insert the router bit the full length of the collet, then tighten the collet and covernut.
- Avoid hitting the tool as this can lead to improper seating and concentricity faults.
- The covernut has to be checked for tightness regularly, even when tool is not changed.
- Use only PERSKE collets and covernuts.
- Use balanced tools only. (Vibration effective value is less than 2.8mm/sec.)

3.2. Warnings

- NEVER USE Router bits with a length of more than 80mm (3.12”) measured from the nut and diameter of more than 60mm (2.37”).
- NEVER USE tooling with a vibration V-eff (effective value) greater than 2.8mm/sec. according to VDI 2056
- NEVER USE tools which are not rated for the motor’s highest speed as stated on the motor’s nameplate
- NEVER USE work pieces which are not securely held/fastened down to the machine table. This will lead to excessive vibrations that greatly reduce bearing life.

4. CATALOG REFERENCES

In addition to an overview of Perske’s standard motor offerings our catalog contains technical details regarding motor design and use. Please refer to the Perske Catalog at http://crpperske.com/pdf/Perske_Catalog_25AM.pdf for the following information:

- Design rules
- Part numbering system
- Allowable shaft loads
- Motor dimension drawings
- Specifications for motor options
    - Special tool holders
    - Direct drive motors
    - Synchronous motors
    - Thermal Connectors
    - Dust/water protection

- Bearing and shaft loads
- Balancing
- Safety and startup instructions
- Protection classes
- Operating modes
- Motor-Collet correlations (general)

5. LIMITED WARRANTY

Seller warrants that the goods and/or services sold by it are free from defects in material and/or workmanship under normal use for a period commencing upon the date of shipment and continuing for one (1) year after that date. For Saw Arbor Motors the warranty period will continue for three (3) years after that date. This Limited Warranty does not cover defects or damage (i) due to failure to use the good for its intended purpose, (ii) resulting from accident, misuse, abuse, neglect, unauthorized alteration, or (iii) because the good was not installed and maintained in accordance with instructions. Any modification or corrective maintenance performed by anyone other than the Seller, without written authorization from Seller, shall void the warranty. The Seller will repair at its factory or replace, at its sole option, without charge any goods or part thereof, upon (i) written notification concerning the claimed defect, including the date purchased and the problem encountered and (ii) when Seller's inspection discloses any such defects. All items to be repaired or replaced may only be returned to Seller within the warranty period in the event a RMA has been obtained from the Seller. THIS WARRANTY SHALL BE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENATIAL DAMAGES (Some states do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion might not be applicable). Seller's employees or representatives' oral or written statements, or any description or specification of goods or any other written statements do not constitute any warranty. This Limited Warranty states the entire obligation of Seller with respect to the goods and/or services. This warranty gives specific legal rights. There might be also other rights, which vary from state to state. If any portion of this Limited Warranty is held illegal or unenforceable by reason of any law, such partial illegality or unenforceability shall not affect the enforceability for the remainder of this Limited Warranty, which Buyer acknowledges is and will always be construed to be limited by its terms or as limited as the law permits.

6. TERMS AND CONDITIONS OF SALE

For further information please visit CRP's website at http://crpperske.com. CRP's terms and conditions of sale as stated at http://crpperske.com/terms.aspx and http://www.crpindustrial.com/termsofsale.aspx apply.